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I U C L I D

Data Set

Existing Chemical	:	ID: 3319-31-1
Memo	:	HPV chemical
CAS No.	:	3319-31-1
EINECS Name	:	tris(2-ethylhexyl) benzene-1,2,4-tricarboxylate
EC No.	:	222-020-0
TSCA Name	:	1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester
Molecular Formula	:	C33H54O6

Producer related part

Company	:	ExxonMobil Biomedical Sciences Inc.
Creation date	:	02.11.2000

Substance related part

Company	:	ExxonMobil Biomedical Sciences Inc.
Creation date	:	02.11.2000
Status	:	
Memo	:	ACC Phthalate Esters Panel HPV Testing Group
Printing date	:	30.03.2006
Revision date	:	
Date of last update	:	30.03.2006
Number of pages	:	48
Chapter (profile)	:	Chapter: 1, 2, 3, 4, 5, 6, 7, 8, 10
Reliability (profile)	:	Reliability: without reliability, 1, 2, 3, 4
Flags (profile)	:	Flags: without flag, confidential, non confidential, WGK (DE), TA-Luft (DE), Material Safety Dataset, Risk Assessment, Directive 67/548/EEC, SIDS

1.0.1 APPLICANT AND COMPANY INFORMATION

Type	:	lead organisation
Name	:	ACC Phthalate Esters Panel HPV Testing Group
Contact person	:	Dr. Marian Stanley
Date	:	
Street	:	1300 Wilson Blvd.
Town	:	22209 Arlington, VA
Country	:	United States
Phone	:	(703) 741-5623
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Telex	:	
Cedex	:	
Email	:	
Homepage	:	

Remark : The American Chemistry Council Phthalate Esters Panel sponsoring this test plan includes the following member companies:

Eastman Chemical Company
ExxonMobil Chemical Company
Sunoco Chemicals
Teknor Apex Company

21.02.2006

1.0.2 LOCATION OF PRODUCTION SITE, IMPORTER OR FORMULATOR

1.0.3 IDENTITY OF RECIPIENTS

1.0.4 DETAILS ON CATEGORY/TEMPLATE

Comment : This chemical is part of the Trimellitate category. The category includes the following four CAS numbers: 3319-31-1, 27251-75-8, 53894-23-8 and 67989-23-5.

Remark : DESCRIPTION OF THE TRIMELLITATES CATEGORY

The trimellitates comprise a family of chemicals synthesized by esterifying trimellitic anhydride with alcohols with average carbon numbers ranging from approximately C7-C10, in the presence of an acid catalyst. The category includes the four trimellitates: 3319-31-1 (TOTM), 27251-75-8 (TIOTM),
53894-23-8 (TINTM), and 67989-23-5 (DOTM). Trimellitates in this category are all 1,2,4-benzenetricarboxylic acids with side chain ester groups ranging from C8 to C10. The structural formula for trimellitates varies somewhat depending on the isomeric composition of the alcohols used in their manufacture. The specific alcohols used are 2-ethylhexanol (TOTM), iso-octyl alcohol (TIOTM), iso-nonyl alcohol (TINTM), and a mixture of linear and branched decyl (40%) and octyl (60%) alcohols (DOTM).

Trimellitates are colorless to slightly yellow liquids with high boiling points (> 250oC) and low vapor pressures; properties which contribute to their

high physical stability. They are readily soluble in most organic solvents and miscible with alcohol, ether and most oils, but essentially insoluble in water. Because of the similarity in structure as well as physicochemical properties, the trimellitates were grouped into a single category containing four substances with carboxylic side chain ester groups ranging from C8-C10.

21.02.2006

1.1.0 SUBSTANCE IDENTIFICATION

1.1.1 GENERAL SUBSTANCE INFORMATION

Purity type	:	
Substance type	:	organic
Physical status	:	liquid
Purity	:	
Colour	:	
Odour	:	

Remark : The products described within this document are the result of a reaction between alcohols and trimellitic anhydride. This reaction is carried to completion and typically 99% or greater of the starting substances are converted to product. Consequently, the only other substances in the final product include very small amounts of free alcohol and trimellitic acid. All testing has been performed on the commercial grade substances without any additive, unless specifically indicated.

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1.1.2 SPECTRA

1.2 SYNONYMS AND TRADENAMES

1.3 IMPURITIES

1.4 ADDITIVES

1.5 TOTAL QUANTITY

1.6.1 LABELLING

1.6.2 CLASSIFICATION

1.6.3 PACKAGING

1.7 USE PATTERN

Type of use : industrial
Category : Polymers industry

Remark : Trimellitates are used predominantly as plasticizers for production of flexible PVC. Because of their relatively high molecular weight (>500 g/mole) and bulky structure, they have lower volatility and greater resistance to migration than the corresponding phthalate ester plasticizers. They are predominantly used in the manufacture of high temperature PVC cables (Wilson, 1996). Since these chemicals are produced in closed systems, there is essentially no occupational exposure to these substances except at the flexible PVC production facility. Usually, these substances have been already blended to the compound as plasticizer, so it is not expected that downstream users or consumers are directly exposed to trimellitates.

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1.7.1 DETAILED USE PATTERN

1.7.2 METHODS OF MANUFACTURE

1.8 REGULATORY MEASURES

1.8.1 OCCUPATIONAL EXPOSURE LIMIT VALUES

1.8.2 ACCEPTABLE RESIDUES LEVELS

1.8.3 WATER POLLUTION

1.8.4 MAJOR ACCIDENT HAZARDS

1.8.5 AIR POLLUTION

1.8.6 LISTINGS E.G. CHEMICAL INVENTORIES

1.9.1 DEGRADATION/TRANSFORMATION PRODUCTS

1.9.2 COMPONENTS

1.10 SOURCE OF EXPOSURE

1.11 ADDITIONAL REMARKS

1.12 LAST LITERATURE SEARCH

1.13 REVIEWS

2.1 MELTING POINT

Value	:	-46 °C
Sublimation	:	
Method	:	
Year	:	
GLP	:	
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester (CAS No. 3319-31-1)
Remark	:	Pour point; purity = 99.0%
Test substance	:	CAS #3319-31-1; 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester
Reliability	:	(2) valid with restrictions This robust summary is assigned a reliability of 2 because there is limited informtion on how the data were developed.

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Value	:	197 °C
Decomposition	:	no, at °C
Sublimation	:	no
Method	:	other
Year	:	
GLP	:	
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester (CAS No. 3319-31-1)
Method	:	Melting point calculation by MPBPWIN ver. 1.40 using calculation methods of Joback and Gold and Ogle.
Remark	:	EPI SuiteTM is used and advocated by the US EPA for chemical property estimation. Melting point calculation seems to give erroneously high results for this class of chemicals.
Test substance	:	CAS #3319-31-1; 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester
Reliability	:	(3) invalid

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2.2 BOILING POINT

Value	:	541 °C at 1013 hPa
Decomposition	:	no
Method	:	other
Year	:	
GLP	:	
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester (CAS No. 3319-31-1)
Method	:	Boiling point calculation by MPBPWIN ver. 1.41 using calculation method of Stein and Brown.
Remark	:	EPI SuiteTM is used and advocated by the US EPA for chemical property estimation.
Test substance	:	CAS #3319-31-1; 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester
Reliability	:	(2) valid with restrictions This robust summary has a reliability rating of 2 because the data are calculated.
Flag	:	Critical study for SIDS endpoint

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2.3 DENSITY

2.3.1 GRANULOMETRY

2.4 VAPOUR PRESSURE

Value	:	.000000078 hPa at 25 °C
Decomposition	:	no
Method	:	other (calculated)
Year	:	
GLP	:	
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester (CAS No. 3319-31-1)
Method	:	Vapor pressure calculation by MPBPWIN ver. 1.41 using calculation method of Grain.
Remark	:	EPI SuiteTM is used and advocated by the US EPA for chemical property estimation.
Test substance	:	CAS #3319-31-1; 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester
Reliability	:	(2) valid with restrictions This robust summary has a reliability rating of 2 because the data are calculated.
Flag	:	Critical study for SIDS endpoint

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Value	:	.133 hPa at 200 °C
Decomposition	:	
Method	:	
Year	:	
GLP	:	
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester (CAS No. 3319-31-1)
Test substance	:	CAS #3319-31-1; 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester
Reliability	:	(4) not assignable

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2.5 PARTITION COEFFICIENT

Partition coefficient	:	
Log pow	:	4.35 at 25 °C
pH value	:	
Method	:	other (measured)
Year	:	1984
GLP	:	yes
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester (CAS No. 3319-31-1)
Remark	:	The study was conducted following the methods outlined in the ABC protocol # A-8003 (revised 6 August, 1984) for CMA Environmental Effects Testing Program with TOTM. 0.4% solutions of TOTM (supplied by CMA) were prepared in n-octanol and 40 ml portions were shaken for 24 hours with 400 ml water. After a 48 hour settling period, aliquots from both phases were drawn to analyse their TOTM concentrations using GC or HPLC.
Source	:	Internaltional Speciality Chemicals Ltd. Hythe

FMC Corporation Manchester.

Test substance	:	CAS #3319-31-1; 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester
Reliability	:	(4) not assignable

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Partition coefficient	:	
Log pow	:	5.94 at 25 °C
pH value	:	
Method	:	OECD Guide-line 107 "Partition Coefficient (n-octanol/water), Flask-shaking Method"
Year	:	2000
GLP	:	yes
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester (CAS No. 3319-31-1)
Source	:	Chemicals Evaluation and Research Institute, Japan Ministry of International Trade and Industry (1998)
Test substance	:	CAS #3319-31-1; 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester
Reliability	:	(2) valid with restrictions

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Partition coefficient	:	
Log pow	:	11.59 at 25 °C
pH value	:	
Method	:	other (calculated)
Year	:	
GLP	:	
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester (CAS No. 3319-31-1)
Method	:	Partition coefficient by KOWWIN ver. 1.67 using an atom/fragment calculation method of Meylan and Howard.
Remark	:	EPI SuiteTM is used and advocated by the US EPA for chemical property estimation.
Test substance	:	CAS #3319-31-1; 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester
Reliability	:	(2) valid with restrictions This robust summary has a reliability rating of 2 because the data are calculated.
Flag	:	Critical study for SIDS endpoint

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2.6.1 SOLUBILITY IN DIFFERENT MEDIA

Solubility in	:	
Value	:	.00005 other: ug/L at 25 °C
pH value	:	
concentration	:	at °C
Temperature effects	:	
Examine different pol.	:	
pKa	:	at 25 °C
Description	:	
Stable	:	
Deg. product	:	
Method	:	other
Year	:	
GLP	:	
Test substance	:	
Method	:	Water solubility calculated using WSKOW ver. 1.41 based on Kow correlation method of Meylan and Howard.

Remark	:	EPI SuiteTM is used and advocated by the US EPA for chemical property estimation.
Test substance	:	CAS #3319-31-1; 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester
Reliability	:	(2) valid with restrictions This robust summary has a reliability rating of 2 because the data are calculated.
Flag	:	Critical study for SIDS endpoint

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Solubility in	:	
Value	:	.00039 mg/l at 25 °C
pH value	:	
concentration	:	at °C
Temperature effects	:	
Examine different pol.	:	
pKa	:	at 25 °C
Description	:	of very low solubility
Stable	:	
Deg. product	:	
Method	:	OECD Guide-line 105
Year	:	1998
GLP	:	yes
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester (CAS No. 3319-31-1)
Source	:	Chemicals Evaluation and Research Institute, Japan Ministry of International Trade and Industry (1998)
Test substance	:	CAS #3319-31-1; 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester
Reliability	:	(4) not assignable

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2.6.2 SURFACE TENSION

2.7 FLASH POINT

2.8 AUTO FLAMMABILITY

2.9 FLAMMABILITY

2.10 EXPLOSIVE PROPERTIES

2.11 OXIDIZING PROPERTIES

2.12 DISSOCIATION CONSTANT

2.13 VISCOSITY

2.14 ADDITIONAL REMARKS

3.1.1 PHOTODEGRADATION

Type	:	air
Light source	:	Sun light
Light spectrum	:	nm
Relative intensity	:	1 based on intensity of sunlight
Conc. of substance	:	at 25 °C
INDIRECT PHOTOLYSIS		
Sensitizer	:	OH
Conc. of sensitizer	:	1500000 molecule/cm³
Rate constant	:	.00000000003277 cm³/(molecule*sec)
Degradation	:	50 % after 3.9 hour(s)
Deg. product	:	
Method	:	other (calculated)
Year	:	
GLP	:	
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester (CAS No. 3319-31-1)
Method	:	Photodegradation rate calculated by AOPWIN ver. 1.91 based on the methods of Atkinson.
Remark	:	50% degradation after 3.9 hrs or 0.326 days based on a 12-hour day. The computer program AOPWIN (atmospheric oxidation program for Microsoft Windows) (EPI SuiteTM, 2000) calculates a chemical half-life for a 12-hour day (the 12-hour day half-life value normalizes degradation to a standard day light period during which hydroxyl radicals needed for degradation are generated), based on an OH- reaction rate constant and a defined OH- concentration. EPI SuiteTM is used and advocated by the US EPA for chemical property estimation.
Test substance	:	CAS #3319-31-1; 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester
Reliability	:	(2) valid with restrictions This robust summary has a reliability rating of 2 because the data are calculated.

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3.1.2 STABILITY IN WATER

Type	:	abiotic
t1/2 pH4	:	at °C
t1/2 pH7	:	.3 year at 25 °C
t1/2 pH9	:	at °C
Deg. product	:	not measured
Method	:	other (calculated)
Year	:	
GLP	:	
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester (CAS No. 3319-31-1)
Method	:	Hydrolysis rate calculated by HYDROWIN ver. 1.67 based on work for EPA by T. Mill et al.
Remark	:	EPI SuiteTM is used and advocated by the US EPA for chemical property estimation.
Test substance	:	CAS #3319-31-1; 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester
Reliability	:	(2) valid with restrictions This robust summary has a reliability rating of 2 because the data are calculated.

17.02.2006 (10)

3.1.3 STABILITY IN SOIL

3.2.1 MONITORING DATA

3.2.2 FIELD STUDIES

3.3.1 TRANSPORT BETWEEN ENVIRONMENTAL COMPARTMENTS

Type :
Media : other: air - biota - sediment(s) - soil - water
Air : % (Fugacity Model Level I)
Water : % (Fugacity Model Level I)
Soil : % (Fugacity Model Level I)
Biota : % (Fugacity Model Level II/III)
Soil : % (Fugacity Model Level II/III)
Method : other: Calculation according Mackay, Level I
Year :

Remark : Physicochemical data used in the calculation:

Parameter	Value w/ Units
Molecular Weight	546.79
Temperature	25° C
Log Kow	11.59
Water Solubility	0.000000045 g/m3
Vapor Pressure	0.00000000078 Pa
Melting Point	-46°C

Result : Using the Mackay Level I calculation, the following distribution is predicted for 1,2,4-benzenetricarboxylic acid, tris(2-ethylhexyl) ester:

% Distribution	Compartment
0.0	Air
0.0	Water
97.7	Soil
2.2	Sediment
0.1	Suspended Sediment
0.0	Biota

Test substance : CAS #3319-31-1; 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester
Reliability : (2) valid with restrictions
This robust summary has a reliability rating of 2 because the data are calculated.
Flag : Critical study for SIDS endpoint
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Type :
Media : other: air - biota - sediment(s) - soil - water
Air : % (Fugacity Model Level I)
Water : % (Fugacity Model Level I)
Soil : % (Fugacity Model Level I)
Biota : % (Fugacity Model Level II/III)
Soil : % (Fugacity Model Level II/III)

Method : other: Calculation according Mackay, Level III
Year :

Remark : Physicochemical data used in the calculation:

Parameter Value w/ Units

Molecular Weight 546.79
Temperature 25° C
Log Kow 11.59
Water Solubility 0.000000045 g/m3
Vapor Pressure 0.00000000078 Pa
Melting Point -46°C

Emissions rates used in the calculation:

Compartment Rate (kg/hr)

Air 1000
Water 1000
Soil 1000

Half-lives used in the calculation:

Compartment Half-life (hr)

Air 3.9a
Water negligible
Soil negligible
Sediment negligible

a - as calculated using AOPWIN version 1.91, a subroutine of the computer program EPI SuiteTM version 3.12 [EPI SuiteTM (2000). Estimation Program Interface for Windows, version 3.12. Syracuse Research Corporation, Syracuse, NY, USA.]

Result : Using the Mackay Level III calculation, the following distribution is predicted for 1,2,4-benzenetricarboxylic acid, tris(2-ethylhexyl) ester:

Compartment % Distribution
Air 0.0
Water 0.0
Soil 99.3
Sediment 0.7

Test substance : CAS #3319-31-1; 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester
Reliability : (2) valid with restrictions
This robust summary has a reliability rating of 2 because the data are calculated.
Flag : Critical study for SIDS endpoint
17.02.2006 (12)

3.3.2 DISTRIBUTION

3.4 MODE OF DEGRADATION IN ACTUAL USE

3.5 BIODEGRADATION

Type	:	aerobic
Inoculum	:	other: Acclimated domestic sewage
Concentration	:	10 mg/l related to Test substance related to
Contact time	:	28 day(s)
Degradation	:	ca. 68.3 - 71.1 (±) % after 28 day(s)
Result	:	
Deg. product	:	
Method	:	other
Year	:	1985
GLP	:	yes
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester (CAS No. 3319-31-1)
Method	:	Method/Guideline-USEPA 1982, CO2 Evolution, Shake Flask. Domestic sewage, mixed liquor. Kinetics-Not Reported Degradation Products-Not Reported Analytical Monitoring-No
Result	:	The results of the first and third test are reported (68.3 and 71.1% biodegrdation respectively).
Test condition	:	Inoculum consisted of deionized water, mineral stocks, aerated mixed liquor, and raw sewage. Inoculum was acclimated prior to test initiation. The test chemicals were added to flasks containing medium and inoculum. The flask were incubated and shaken in the dark for 28 days. Twelve flasks were prepared; 3 controls, 3 dextrose, 3 test substance and 3 with test substance and HgCl2 (to prevent microbial growth). The CO2 production was captured in KOH solution. 500ml Erlenmeyer flasks were used as test vessels. Test flasks were shaken at a rate of 60rpm at 25 +/- 2 deg C. Plate count at initiation was 1.7 x 105 colony/ml. The pH at initiation was not reported. Three test trials were conducted. The methods described are those of trial #3. Nominal test concentration for all substances = 10mg/L
Test substance	:	CAS #3319-31-1; 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester
Conclusion	:	The substance is biodegradable using mixed populations of microorganisms.
Reliability	:	(1) valid without restriction This robust summary is assigned a reliability of 1 because it followed a standard procedure and applied GLP.
Flag	:	Critical study for SIDS endpoint

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Type	:	
Inoculum	:	activated sludge, domestic
Contact time	:	39 day(s)
Degradation	:	(±) % after
Result	:	
Deg. product	:	
Method	:	OECD Guide-line 301 F "Ready Biodegradability: Manometric Respirometry Test"
Year	:	1992
GLP	:	yes
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester (CAS No.3319-31-1)
Result	:	Biodegradation was based on oxygen consumption and the theoretical oxygen demand of the test substance as calculated using results of an elemental analysis of the test substance.

By day 4, >60% biodegradation of positive control was observed, which meets the guideline requirement. No deviations from the protocol occurred that affected the integrity of the study data.

The test substance biodegraded to 46.8% after 28 days and cannot be considered readily biodegradable.

Sample	% Degradation* (day 28)	Mean % Degradation (day 28)
Test Substance	32.9, 60.7**	46.8
Na Benzoate	83.6, 91.5, 83.9	86.3

Sample	% Degradation* (day 39)	Mean % Degradation (day 39)
Test Substance	42.9, 78.9**	60.9
Na Benzoate	83.6, 91.5, 83.9	86.3

* replicate data

**A replicate was excluded due to excessive oxygen consumption, indicating a breach or electrical malfunction.

The difference of extremes for the test substance replicates at 28 days was 59%.

Test condition : Duplicate test systems were used to evaluate the biodegradability of the test and positive control substances at mean concentrations of 50.5 mg/L and 51.4 mg/L, respectively. Blank test systems, which did not contain the test or positive control substance, were run concurrently in triplicate.

The total suspended solids (TSS) of the activated sludge was determined to be 3.93 g/L. The inoculum was added at a 1% loading volume of sludge supernatant to test medium. The microbial count of the inoculum was 106 CFU/mL. One liter of test medium, which was aerated for 24 hours with carbon dioxide free air, was added to each one liter respirometer flask. The test substance was administered by direct addition on glass fiber filters into the test medium. The test system was sealed immediately after addition of the test substance. An aliquot of the positive control stock solution was added to the appropriate test flasks.

An unacclimated activated sludge inoculum was used in this study. The inoculum was obtained from the Clinton Sanitary Wastewater Treatment Plant, Annandale, NJ, USA. The treatment plant receives domestic sewage.

All test systems were placed on a Coordinated Environmental Services (CES) automated respirometer which automatically recorded the oxygen uptake in general agreement with the OECD guideline. The 39-day study was conducted at a temperature range of 22 ± 1°C °C.

Test substance : CAS Number: 3319-31-1; 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester

Conclusion : Not readily biodegradable.

Reliability : (1) valid without restriction
This study has a reliability code of 1 because it followed a standard guideline and used GLP.

23.02.2006 (11)

3.6 BOD5, COD OR BOD5/COD RATIO

3.7 BIOACCUMULATION

3.8 ADDITIONAL REMARKS

4.1 ACUTE/PROLONGED TOXICITY TO FISH

Type	:	semistatic
Species	:	Oryzias latipes (Fish, fresh water)
Exposure period	:	96 hour(s)
Unit	:	
Limit test	:	
Analytical monitoring	:	yes
Method	:	OECD Guide-line 203 "Fish, Acute Toxicity Test"
Year	:	1998
GLP	:	yes
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester (CAS No. 3319-31-1)
Method	:	Statistical methods: Not applicable because of lack of mortality.
Remark	:	Species/Strain/Supplier: Oryzias latipes(Medaka); Obtained from commercial domestic hatcheries. Analytical monitoring: Yes. Test solutions were measured by HPLC before and after 24 hours exposure period. Test solutions were replaced every 24 hours to new ones.
Result	:	Nominal concentrations: 0, 100 mg/L Measured concentrations: <1, 103(0hr)mg/L, <1, 102(24hr)mg/L Mortality of control: 1 fish dead at 96h. Mortality of dispersent control: 0 fish dead at 96h. Mortality of test substance: 1 fish dead at 48h. Total mortality at test termination was 1 fish. Abnormal responses: At 24 hr, one fish showed abnormal breathing behaviour at 100mg/L. Reference substances: Copper(II)sulfate pentahydrate. LC50 at 96h was 0.43 mg/L. Any observations, such as precipitation that might cause a difference between measured and nominal values: It became clouded in 100mg/L concentration, but not precipitation.
Test condition	:	Test Fish: Acclimated for more than 12 days before testing; any groups showing no mortality for 7 days before test started. Fish with 22.1 mm (18.3~23.8 mm) in length were selected at random. Average body weight of fish was 0.1462 g (n=10). Details of test: Semi-static (water changed every 24 hours) Dilution water source: Tap water after dechlorinated by passing through activated carbon. Dilution water chemistry: Hardness: 25 mg/L as CaCO3; pH: 6.7 Stock and test solution and how they are prepared: Pipette or pour the appropriate amount of the solution (0.3 wt% of test chemical with solubilizer hydrogenated caster oil HCO-40 3000mg/L) into the test waters. Concentrations dosing rate, flow-through rate, in what medium: Concentrations of 0, 100 mg/L and dispersant control were tested. Vehicle/solvent and concentrations: Hydrogenated caster oil HCO-40, 100 mg/L Stability of the test chemical solutions: Stable, measured concentration was 101-103%. Exposure vessel type: 10 fish per group in 3L glass beaker without aeration under room light. Number of replicates, fish per replicate: One replicate was done. Water chemistry in test (O2, pH) in the control and all concentration where effects were observed: Dissolved oxygen readings and pH values were

taken daily during 96 h exposure period.
Dissolved oxygen concentration: 5.0~9.2 mg/L.
pH values: 6.7~6.8.
Test temperature range: Water temperature at 23.5~24.1°C.
Method of calculating mean measured concentrations: Geometric mean.

Conclusion : One fish died after 48 hours in the test substance system. One fish died after 96 hours in the control system. Although testing was conducted at a loading that far exceeded the test substance water solubility causing the exposure solution to become cloudy, the test results are believed to support an assessment of no toxicity for the test substance at saturation.

Reliability : (1) valid without restriction
This study has a reliability code of 1 because it followed a standard guideline and used GLP.

Flag : Critical study for SIDS endpoint

17.02.2006 (8)

Type : flow through
Species : Oryzias latipes (Fish, fresh water)
Exposure period : 14 day(s)
Unit :
Method : OECD Guide-line 204 "Fish, Prolonged Toxicity Test: 14-day Study"
Year : 1998
GLP : yes
Test substance : other TS: 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester (CAS No. 3319-31-1)

Method : Statistical methods: Binomial method (TOXDAT MULTI-METHOD PROGRAM, USEPA) Dunnet method was used for LC50 and for fish body weight difference, respectively.

Remark : Species/Strain/Supplier: Oryzias latipes (Medaka); Obtained from commercial domestic hatcheries.

Analytical monitoring: Yes. Test solutions were measured by HPLC before and after 7, 14-day exposure period.

Result : Nominal concentrations: 0, 18.8, 37.5, 75.0 (mg/L) and dispersant control
Measured concentrations: Measured concentration of the test chemical during a 14-day exposure of orange killifish (Oryzias latipes) under flow-through test conditions
Nominal concentration (mg/L) Measured concentration (mg/L) (percent of nominal)

	0 day	7 day	14 day	Mean
Control	< 1.0	< 1.0	< 1.0	--
Dispersant Control	< 1.0	< 1.0	< 1.0	--
18.8	17.7(94.1)	15.8(84.0)	15.5(82.4)	16.3(86.9)
37.5	35.7(95.2)	33.2(88.5)	30.0(80.0)	33.3(87.9)
75.0	70.6(94.1)	68.8(91.7)	71.2(94.9)	70.2(93.6)

Statistical results, as appropriate: The mean body weight of fish exposed to all concentration of the test chemical was not significantly different from controls during the test period (alfa=0.05, Dunnet).
Remarks:
Mortality of control: 1 fish dead on day 12. Total control mortality at test termination was 1 fish.
Mortality of dispersent control: 0 fish dead on day 14.
Mortality of test substance: 0 fish dead on day 14.

Lowest test substance concentration causing 100% mortality: >75.0 mg/mL (nominal).
Mortality of controls: 10 % mortality observed during the test period (12 through 14 days
Food intake: Fish was fed with TetraMin® fish food (2% of fish body

weight).
Abnormal responses: No abnormal response showed through 14 days.
Reference substances (if used) - results: Copper (II) sulfate pentahydrate. LC50 at 96h was 0.30 mg/L.
Any observations, such as precipitation that might cause a difference between measured and nominal values: It became clouded high concentration, but not precipitation.

Test condition : Test fish: Acclimated for more than 12 days before testing; any groups showing 2.9% mortality for 7 days before test started. Fish with 20.0 mm (18.5~21.6 mm) in length were selected at random. Average body weight of fish was 0.1484g (0.1182~0.2014g)(n=10). Fish were starved for 24 hours before the test started.

Details of test: Flow-through.
Dilution water source: Tap water after dechlorinated by passing through activated carbon.
Dilution water chemistry: Hardness: 15.3mg/L as CaCO3; pH: 7.0
Stock and test solution and how they are prepared: The working solution (4.8wt% of test chemical with solibilizer HCO-40 controlled) was prepared with the dilution water. The test solution was supplied continuously by mixing the working solution and the dilution water with the help of a mechanically operated quantitative water-pump.
Concentrations dosing rate, flow-through rate, in what medium: Nominal concentrations of 0, 18.8, 37.5 and 75.0 mg/L and Dispersant control were tested.
Vehicle/solvent and concentrations: Hydrogenated caster oil HCO-40, Max. 75.0 mg/L
Stability of the test chemical solutions: It became clouded in high concentration, but not precipitation.
Exposure vessel type: 10 fish per group in 3L glass beaker without aeration under room light.
Number of replicates, fish per replicate: One replicate was done.
Water chemistry in test (O2, pH) in the control and one concentration where effects were observed: Dissolved oxygen readings and pH values were taken every 3 days during the exposure period.
Dissolved oxygen concentration: 6.6~7.7 mg/L.
pH values: 6.9~7.2.
Test temperature range: Water temperature at 23.5~24.1°C (24±2°C).
Method of calculating mean measured: Geometric mean.

Test substance : CAS #3319-31-1; 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester

Conclusion : Although testing was conducted at a loading that far exceeded the test substance water solubility, the test results are believed to support an assessment of no toxicity for the test substance at saturation.

Reliability : (1) valid without restriction
This study has a reliability code of 1 because it followed a standard guideline and used GLP.

17.02.2006 (9)

4.2 ACUTE TOXICITY TO AQUATIC INVERTEBRATES

Type	:	static
Species	:	Daphnia magna (Crustacea)
Exposure period	:	48 hour(s)
Unit	:	
Analytical monitoring	:	yes
Method	:	OECD Guide-line 202
Year	:	1998
GLP	:	yes
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester (CAS No. 3319-31-1)

Method : Statistical methods: Not applicable.

Remark : Analytical monitoring: Yes. Test solutions were measured by HPLC before and after 48 hours exposure period.

Result : Nominal concentrations: 17.1, 30.9, 55.6, 100.0, 180.0 (mg/L) (Solubilizer controlled)

Measured concentrations:
Measure Concentrations of test chemicals during a 48hr.

Nominal Concentration (mg/L)	Measured Concentration(mg/L) 0hr	48hr	Mean	Percent of Nominal 0hr	48hr
Control	< 1.0	< 1.0	-	-	-
Disp.Cont.	< 1.0	< 1.0	-	-	-
17.1	16.3	15.4	15.8	95.3	90.1
30.9	29.4	28.5	28.9	95.1	92.2
55.6	53.0	52.1	52.5	95.3	93.7
100.0	98.4	96.3	97.3	98.4	96.3
180.0	179.2	175.8	177.5	99.6	97.7

Immobility of control: 0 daphnia immobile after 48 hours.
Immobility of dispersent control: 1 daphnid immobile after 48 hours.
Immobility of test substance: 1 daphnid immobile after 48 hours in the 17.1 mg/L loading. 0 daphnia immobile after 48 hours in the 4 higher loading levels.

Test condition : Test organisms
Source, supplier, any pre-treatment, breeding method: Supplied by NIES (Japan).
Age at study initiation: Juveniles within 24h old.
Control group: Yes.

Test conditions: Stock solutions preparation and stability: No solvent used. Test chemical was diluted to 1800mg/L(with solubilizer HCO-40 1000mg/L controlled) with diluting water (Elendt M4) before use.

Test temperature range: 19.9-20.2 °C (average temperature 20°C).
Exposure vessel type: 100mL test solution in a 100 mL glass beaker; 4 beakers per treatment
Dilution water source: Elendt M4(OECD guideline No.211 Annex 2)
Dilution water chemistry: Hardness: 228mg/L as CaCO3
Lighting: room light 16h:8h light-darkness cycle
Water chemistry in test: DO= 8.0-8.6mg/L; pH=7.3-7.8.
Feeding: none

Test design
Number of replicates=20
Concentrations: 0, 17.1, 30.9, 55.6, 100 and 180 mg/L, because 48h-EiC50 for parent Daphnia (Acute immobilization test) was >1000mg/L. Dispersant control was also tested.

Method of calculating mean measured concentrations: Geometric mean.
Exposure period: 48 h
Analytical monitoring: By HPLC analysis. 95.1-99.6% of the nominal concentration at preparation; 90.1-97.7% after 48hr.

Test substance : CAS #3319-31-1; 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester

Conclusion : Although testing was conducted at loadings that far exceeded the test substance water solubility, the test results are believed to support an assessment of no toxicity for the test substance at saturation.

Reliability : (1) valid without restriction
This study has a reliability code of 1 because it followed a standard guideline and used GLP.

Flag : Critical study for SIDS endpoint

21.02.2006 (7)

4.3 TOXICITY TO AQUATIC PLANTS E.G. ALGAE

Species	:	Selenastrum capricornutum (Algae)
Endpoint	:	
Exposure period	:	72 hour(s)
Unit	:	
Limit test	:	
Analytical monitoring	:	yes
Method	:	OECD Guide-line 201 "Algae, Growth Inhibition Test"
Year	:	1998
GLP	:	yes
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester (CAS No. 3319-31-1)
Method	:	Statistical methods: Bartlett test for homogeneity in variances and One-way Anova (EcoTox-Statistics Ver.1.0 beta-edition R1.4) were used for EC50, LC50 and NOEC determination (p=0.05).
Remark	:	Test type: Static. Species/strain # and source: Selenastrum capricornutum ATCC22662 (purchased from ATCC) Element basis: Area under the growth curve. Analytical monitoring: Yes, measured by HPLC at start and end of the test (72hr).
Result	:	Nominal concentrations: 0, 100 (mg/L) and dispersant control. Measured concentrations: At start of the test (0 hr), <1.0, 80.6, <1.0(mg/L) At end of the test (72 hr), <1.0, 68.7, <1.0 (mg/L) Unit: mg/L Results: (calculated based on nominal concentrations) (1) Growth inhibition (comparison of area under growth curve) No growth inhibition at saturation (2) Growth inhibition (comparison of growth rates) No growth inhibition at saturation NOEC (24-72) = 100 mg/L Mean cell density increased to 2.70x106 cells/mL (270-fold increase) after 72 hr for control. Mean cell density increased to 2.75x106 cells/mL (275-fold increase) after 72 hr for Dispersant control. Significant difference in the growth curve was not observed between values at 100 mg/L and in each control. Remarks Biological observations Cell density at each flask at each measuring point:

Nominal Concentration (mg/L)	Cell Density (x104 cells/mL) 0 hr	24 hr	48 hr	72 hr
Control	1.0 ± 0.00	6.5 ± 0.50	50.5 ± 3.48	270.5 ± 23.50
Dispersant Control	1.0 ± 0.00	9.3 ± 1.66	57.5 ± 9.39	275.2 ± 17.22

100 1.0 ± 0.00 16.1 ± 7.82 65.1 ± 12.82 283.3 ± 7.98
(Each value represents the mean of three sample counts.)

Growth curves: Logarithmic growth until end of the test (72 hr).
Observations: Test group(100mg/L) showed normal and similar growth to that of control (283 fold increase after 72 hr).

Test condition : Test organisms
Laboratory culture: OECD medium
Method of cultivation: Shaking at 100rpm
Controls: OECD medium. EC50 of potassium dichromate was 0.41 mg/L.

Test Conditions
Test temperature range: 23±2 °C
Growth/test medium: OECD medium.
Shaking: 100 rpm
Dilution water source: OECD medium.
Exposure vessel type: 100 mL OECD medium in a 300 mL Erlenmeyer flask with a silicon cap which allows ventilation. Water chemistry in test (pH) in at least one replicate of each concentration (at start and end of the test): pH=7.3-7.4 at start and 8.3-8.8 at end of the test (72h)
Stock solutions preparation: No stock solution was prepared. Test chemical was diluted to 100mg/L (solubilizer, HCO-40 100mg/L) with OECD medium and sterilised with filter before use. Light levels and quality during exposure: 4,756-4,822 lux, continuous illumination.

Test design
Number of replicates: Triplicate
Concentrations: 0, 100 mg/L and dispersant control were tested.
Initial cell number in cells/mL: 1x104
Method of calculating mean measured concentrations: Geometric mean.

Test substance : CAS #3319-31-1; 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester

Conclusion : Although testing was conducted at a loading that far exceeded the test substance water solubility, the test results are believed to support an assessment of no toxicity for the test substance at saturation.

Reliability : (1) valid without restriction
This study has a reliability code of 1 because it followed a standard guideline and used GLP.

Flag : Critical study for SIDS endpoint

21.02.2006 (6)

4.4 TOXICITY TO MICROORGANISMS E.G. BACTERIA

4.5.1 CHRONIC TOXICITY TO FISH

4.5.2 CHRONIC TOXICITY TO AQUATIC INVERTEBRATES

Species	:	Daphnia magna (Crustacea)
Endpoint	:	
Exposure period	:	21 day(s)
Unit	:	mg/l
NOEC	:	= .082
LOEC	:	> .082
EC50	:	> .082
LC50	:	> .082
Method	:	other: ASTM and USEPA
Year	:	1984
GLP	:	yes

Test substance : other TS: 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester (CAS No. 3319-31-1)

Method : Statistical methods: ANOVA, 2WANOVA, arcsin transformation and Fisher's protected Least Significant Difference (LSD)

Remark : Test type: Flow-through condition

Analytical procedures: Yes. Measured by GLC, (on 0, 4, 7, 14, 21day)

Test details: Dynamic flow-through

Result : Nominal concentrations: 0, 0.0074, 0.012, 0.027, 0.048, 0.100 mg/L

Measured concentrations:
Measured concentration of test chemical during 21-day exposure

Nominal conc. (mg/L)	Measured conc. (day, mg/L) 0	4	7	14	21	mean
Control	ND	ND	ND	ND	ND	ND
Solvent Control	ND	ND	ND	ND	ND	ND
0.0074	0.00328	0.00366	0.00558	0.00246	0.00482	0.0040
0.012	0.00748	0.00626	0.00843	0.00478	0.00747	0.0069
0.027	0.0172	0.0150	0.0204	0.0110	0.0157	0.0159
0.048	0.0305	0.0252	0.0371	0.0176	0.0348	0.029
0.100	0.0824	0.0766	0.0870	0.0630	0.1011	0.082

Cumulative Number of Dead Parental Daphnia.

Nominal conc. (mg/L)	Days 0	3	5	7	10	12	14	17	19	21
Control	0	0	0	0	0	0	0	1	1	2
Solvent Cont.	0	0	0	0	0	1	1	2	3	4
0.0074	0	0	0	0	0	1	1	1	1	1
0.012	0	0	0	0	0	0	0	0	0	0
0.027	0	0	0	0	0	0	0	0	0	0
0.048	0	0	0	0	1	1	1	1	1	1
0.100	0	0	0	0	0	0	0	0	0	0

Mean Growth data of Parental Daphnia (21-d)

Nominal conc. (mg/L)	Replicate A	Replicate B	Replicate C	Replicate D
Control	58.6 (n=9)	58.4 (n=9)	58.8 (n=10)	58.5 (n=10)
Solvent Cont.	59.1 (n=7)	59.0 (n=10)	59.0 (n=9)	59.3 (n=10)
0.0074	59.5 (n=10)	58.5 (n=10)	60.1 (n=9)	59.5 (n=10)
0.012	59.1 (n=10)	59.4(n=10)	59.5 (n=10)	59.8 (n=10)
0.027	59.8 (n=10)	58.4 (n=10)	59.9 (n=10)	60.3 (n=10)
0.048	59.6 (n=10)	59.6 (n-10)	59.7 (n=9)	58.6 (n=10)
0.100	58.7 (n=10)	60.0 (n=10)	58.8 (n=10)	59.0 (n=10)

Mean numbers of instar produced during 21-d.

Nominal conc. (mg/L)	Days 0	3	5	7	10	12	14	17	19	21
Control	-	-	-	-	109	196	317	86	179	170
Solvent Cont.	-	-	-	16	164	178	240	75	156	
0.0074	-	-	-	3	141	202	302	261	75	274
0.012	-	-	-	3.5	122	206	373	221	96	265
0.027	-	-	-	8.3	150	189	317	218	138	313
0.048	-	-	-	-	113	203	242	120	233	214
0.100	-	-	-	5.3	135	186	223	180	93	269

Remarks

Biological observations
Cumulative numbers of dead parental Daphnia:
Control: 2 (mortality: 5%)
Solv. Cont: 4 (mortality: 10%)
0.0074 mg/L: 1 (mortality: 2.5%)
0.012 mg/L: 0 (mortality: 0%)
0.027 mg/L: 0 (mortality: 0%)
0.048 mg/L: 1 (mortality: 2.5%)
0.100 mg/L: 0 (mortality: 0%)

Time of the first production of juveniles:
Control: 7-10d
Solvent control: 5-7d
0.0074 mg/L: 5-7d
0.012 mg/L: 5-7d
0.027 mg/L: 5-7d
0.048 mg/L: 7-10d
0.100 mg/L: 5-7d

Mean cumulative numbers of juveniles produced per adult alive for 21days:
Control: 112.7
Solvent control: 168.5
0.0074mg/L: 119.6
0.012 mg/L: 139.3
0.027 mg/L: 133.3
0.048 mg/L: 116.0
0.100 mg/L: 112.9
Control response was satisfactory.

Test condition : Test organisms
Source: in house culture
Age at study initiation: Juveniles within 24h old.
Control group: Yes (control and solvent control).

Test conditions
Dilution Solvent for Concentrated stock standards: Acetone (1.049mg/mL)
A proportional diluter system was used for the intermittent introduction of test material and dilution water into the test chambers.
Test temperature range: 18-22 °C (average temperature 20°C).
Well water was delivered to the chambers as a minimum rate of 2.0mL/min.
Exposure vessel type: 900mL test solution in a 1000 mL glass beaker; 4 beakers per treatment.
Dilution water chemistry: Hardness and other characteristics are reported.
Dilution water pH in test: pH=8.3-8.4.
Lighting: 37-74 footcandles , 16h:8h light-darkness cycle
Feeding: Algae (Selenastrum capricornutum) three times a day.
Supplemented with a trout chow suspension at least twice a week.

Element (unit) basis
Mean cumulative numbers of juveniles produced per adult (reproduction)
Growth (length) of parental Daphnia
Long-term survival

Test design
Number of replicates=4; individuals per replicate=10;
Method of calculating mean measured concentrations: Geometric mean.

Exposure period: 21 d

Analytical monitoring: By GLC analysis. 33-101% of the nominal concentration at Preparation.

Test substance : CAS #3319-31-1; 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester

Conclusion : NOEC (21-d, reproduction): = 0.082 mg/L

LOEC (21-d, reproduction): >0.082 mg/L
EC50 (21-d, reproduction): >0.082 mg/L
LC50 for parental Daphnia (21-d): >0.082 mg/L

Reliability : (1) valid without restriction
This study has a reliability code of 1 because it followed a standard guideline and used GLP.

Flag : Critical study for SIDS endpoint

21.02.2006 (4)

4.6.1 TOXICITY TO SEDIMENT DWELLING ORGANISMS

4.6.2 TOXICITY TO TERRESTRIAL PLANTS

4.6.3 TOXICITY TO SOIL DWELLING ORGANISMS

4.6.4 TOX. TO OTHER NON MAMM. TERR. SPECIES

4.7 BIOLOGICAL EFFECTS MONITORING

4.8 BIOTRANSFORMATION AND KINETICS

4.9 ADDITIONAL REMARKS

5.0 TOXICOKINETICS, METABOLISM AND DISTRIBUTION

5.1.1 ACUTE ORAL TOXICITY

Type	:	LD50
Value	:	> 2000 mg/kg bw
Species	:	rat
Strain	:	Crj: CD(SD)
Sex	:	male/female
Number of animals	:	10
Vehicle	:	other: Corn oil
Doses	:	0(vehicle) and 2,000 mg/kg
Method	:	OECD Guide-line 401 "Acute Oral Toxicity"
Year	:	1996
GLP	:	yes
Test substance	:	other TS: Tris(2-ethylhexyl)benzene-1,2,4-tricarboxylate
Method	:	Statistical methods: Not applicable because of no fatality.
Remark	:	Test type: Single Dose Oral Toxicity Test Route of administration: Oral (by single-dose gavage) Post exposure observation period: Two weeks
Result	:	LD50: Male: > 2,000 mg/kg; Female: > 2,000 mg/kg Body weight: The test substance did not cause any changes in body weight. No detailed body weight data available. Food/water consumption: No detailed data available. Clinical signs: Loosening erring of the stool attributable to the treatment with corn oil was observed for 3 hours from the administration for both sexes in the groups given 0 and 2000 mg/kg. However, no deaths occurred of either male or female animals. Haematology: Not done. Biochem: Not done. Ophthalmologic findings: Not examined. Mortality and time to death: No deaths were recorded in treated and control group. Gross pathology incidence and severity: No macroscopic abnormalities that could be attributes to treatment with the test substance were seen on pathological examination. Organ weight changes: Not done. Histopathology (incidence and severity): Not done.
Test condition	:	Test Subjects Age at study initiation: 6 weeks old for both sexes. Weight at study initiation: 149-163 g for male; 126-140 g for female No. of animals per sex per dose: 5 per sex per dose group Study Design

Vehicle: Corn oil. 40.0w/v% for 2000 mg/kg.
Satellite groups and reasons they were added: None
Clinical observations performed and frequency: Each rat was weighed immediately prior to treatment, 7 and 14 days after
post-treatment observation period. The rats were observed each hour to 6hr, after that, 2 times for one day during this time for signs of toxicity.

Test substance : Tris(2-ethylhexyl)benzene-1,2,4-tricarboxylate
Source: Daihachi Kagaku Kogyo Co., Ltd. Lot. No. N-60601, Purity: >99.0%
Kept at room temperature in a dark place until use. Stability of mixture of dose was confirmed for 7 days under 4C.

Conclusion : LD50 was established at > 2,000 mg/kg for both sexes.

Reliability : (1) valid without restriction
Well conducted study, carried out by the Biosafety Research Center, Food, Drugs and Pesticides (An-pyo Center), Japan.

Flag : Critical study for SIDS endpoint

06.03.2006 (14)

5.1.2 ACUTE INHALATION TOXICITY

Type : LC50
Value : > 2600 mg/m³
Species : rat
Strain : Crj: CD(SD)
Sex : male/female
Number of animals : 10
Vehicle :
Doses : 2,600 mg/m3
Exposure time :
Method : other: not specified
Year : 1982
GLP : yes
Test substance : other TS: Tris(2-ethylhexyl)benzene-1,2,4-tricarboxylate

Method : Statistical methods: Not applicable because of no fatality.
Remark : Post exposure observation period: Two weeks
Result : LC50: Male: > 2,600 mg/m3; Female : > 2,600 mg/m3

Body weight: The test substance did not cause any changes in body weight.

Mean body weight(g) of rats exposed to this chemical
Males Initial weight 265.1(8.40)
First week 297.8(14.02)
Second week 329.7(15.27)
Females Initial weight 213.9(2.66)
First week 223.2(3.96)
Second week 238.1(4.82) Mean(S.D.)

Food/water consumption: No detailed data available.

Clinical signs: All animals (male and female) had matted, drenched coats for the first 2 days, otherwise no visible signs.

Haematology: Not done.

Biochem: Not done.

Ophthalmologic findings: Not examined.

Mortality and time to death: No deaths were recorded.

Organ weight changes: Not done.

General necropsy observations: All males and 3/5 females exhibited reddening patches on lungs.

Test condition : Test Subjects
Age at study initiation: Not stated.
Weight at study initiation: 210-275 g for both sexes.
No. of animals per sex per dose: 5 per sex per dose group

Study Design
Inhalation Chamber: A 0.5m3 stainless steel inhalation chamber was used. (Youg and Bertke, Cincinnati, Ohio)
The test compound atmosphere was generated directly into the chamber by means of Jet Nebulizer Mechanism. Chamber concentrations were monitored by a filter paper/gravimetric technique approximately every 30 min during the exposure period.
The HEPA filtered chamber air-flow was maintained between 10 to 20 air changes per hour during the exposure period with the chamber under slightly negative pressure.
The temperature in the chamber was maintained at 69-75 degree F with relative humidity of 30-50%
Satellite groups and reasons they were added: None
Clinical observations performed and frequency: After the exposure, all animals were observed daily for 14 days for clinical signs of toxicity. Body weights were recorded prior to exposure and weekly thereafter. All animals were subjected to necropsy at termination of the study.

Test substance : Tris(2-ethylhexyl)benzene-1,2,4-tricarboxylate
Source: Nouplaz 6959, Batch No. 39049, Purity: 98.95%

Conclusion : LC50 was > 2,600 mg/m3 for both sexes.

Reliability : (1) valid without restriction
Well conducted study, carried out by Midwest Research Institute.

Flag : Critical study for SIDS endpoint

30.03.2006 (18)

5.1.3 ACUTE DERMAL TOXICITY

Type : LD50
Value : > 2 ml/kg bw
Species : rabbit
Strain : other: New Zealand albino white rabbits
Sex : male/female
Number of animals : 10
Vehicle :
Doses : 2.0 mL/kg
Method : other: Procedure set forth in the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)
Year : 1981
GLP : yes
Test substance : other TS: Tris(2-ethylhexyl)benzene-1,2,4-tricarboxylate

Method : Statistical methods: Not applicable because of no fatality.
Remark : Post exposure observation period: Two weeks
Result : LD50: Male: > 2.0 mL/kg; Female: > 2.0 mL/kg

Body weight: The test substance did not cause any changes in body weight.

Individual Animal Body Weights

Sex	Body weight (kg)		
Control	day 1	day 7	day 14
male	3.2	3.4	3.6
	3.2	3.4	3.6
female	2.7	3.0	3.1
	2.9	3.1	3.3
2.0 mL/kg male	2.3	2.3	2.5
	2.4	2.4	2.5
	2.3	2.2	2.4
female	2.3	2.5	2.7
	2.4	2.6	2.7
	2.4	2.5	2.6

Food/water consumption: No detailed data available.

Clinical signs: No toxic sign.

Haematology: Not done.

Biochem: Not done.

Ophthalmologic findings: Not examined.

Mortality and time to death: No deaths were recorded.

Organ weight changes: Not done.

Gross Pathology: Nothing noted.

Test condition : Test Subjects
Age at study initiation: Not stated.
Weight at study initiation: 2.3-3.2 kg for both sexes.
No. of animals per sex per dose: 3 per sex per dose group and 2 per sex for control.

Study Design
Procedure: 24 hours prior to treatment the hair on the back of each rabbit was clipped so as to expose approximately 10% of the body surface area. Before dosing, epidermal abrasions were made longitudinally over the exposure area. The abrasions were sufficiently deep to penetrate the stratum corneum but not so deep as to cause bleeding. A dosage was applied to the exposure area. A 2 x 2-inch gauze pad was placed on the exposure area to prevent seepage of the compound from the area. Each animal was then wrapped with a rubber dam. After 24 hour of exposure, the rubber dam and gauze pad were removed, and the exposure area was wiped to remove any remaining test material.
Satellite groups and reasons they were added: None
Clinical observations performed and frequency: After the exposure, all animals were observed daily for 14 days for clinical signs of toxicity. A gross necropsy was performed on all animals at the end of the 14 day observation period.

Test substance : Tris(2-ethylhexyl)benzene-1,2,4-tricarboxylate
Source: Nouplaz 6959, Batch No. 39049, Purity: 98.95%

Conclusion : LD50 was > 2.0 mL/kg for both sexes.

Reliability : (1) valid without restriction
Well conducted study, carried out by Midwest Research Institute.

Flag : Critical study for SIDS endpoint

06.03.2006 (17)

5.1.4 ACUTE TOXICITY, OTHER ROUTES

5.2.1 SKIN IRRITATION

5.2.2 EYE IRRITATION

5.3 SENSITIZATION

5.4 REPEATED DOSE TOXICITY

Type	:	Sub-acute
Species	:	rat
Sex	:	male/female
Strain	:	Fischer 344
Route of admin.	:	oral feed
Exposure period	:	28 day(s)
Frequency of treatm.	:	once daily
Post exposure period	:	none
Doses	:	0(0), 0.2(184), 0.67(650) and 2(1826) % (mg/kg bw/day)
Control group	:	other: Dietary level 0% and reference compound DEHP 0.67%.
Method	:	other: BIBRA Standard Operating Procedures
Year	:	1985
GLP	:	yes
Test substance	:	other TS: Tris(2-ethylhexyl)benzene-1,2,4-tricarboxylate

Method :

Statistical methods:
The control and TOTM treated groups were subject to analysis of variance, and if this was significant the treated groups were compared with the controls using the Least Significant Difference test. The controls and DEHP groups were compared using a two-tailed pooled student t test with Welch's correction. In all cased a probability level of $P<0.05$ was taken to indicate statistical significance.

Remark :

Test type: Repeat Dose Toxicity

Vehicle: Rodent diet

Duration of test: Males and females; for 28 days

Result :

NOAEL 184 mg/kg bw/day
LOAEL 650 mg/kg bw/day

Body weight: No statistically significant differences of bodyweight between the control and TOTM treated groups of either sex. There was a trend for the male rats from all the TOTM treated groups to be lighter than the controls (92 to 97% of control). In the females, this trend was only evident in the 2.0% TOTM group (94% of control).

Food/water consumption: Female rats fed 2.0% TOTM consumed significantly less diet than the controls during first seven days of treatment after which their intakes increased but remained lower than those of the controls. In the males there were no statistically significant differences between the control and TOTM fed groups during the treatment period.

Haematology: In both sexes haemoglobin concentration of the rats given diet containing 0.67 or 2.0% TOTM were statistically significantly lower

than the control (94 to 97% of control). In the males there was a small lowering of erythrocyte count in all groups given TOTM (96 to 97% of control) but this was not reproduced in the females. Both sexes given the two higher dietary concentrations of TOTM had higher leucocyte counts than the control (118 to 123% of control), but the differences were statistically significant only in the males. These male groups also had lower proportions of the leucocytes as eosinophils and monocytes (42 to 67 and 26 to 37%, respectively). Significantly lower values for haemotocrit and mean cell volume were limited to females given the two lower dose levels of TOTM (91 to 95 and 96 to 97% , respectively).

Organ weights: In both sexes the liver weights, and liver weights relative to bodyweight, were increased in the TOTM (114 to 135% of control) treated animals compared to the controls. These differences were small and not statistically significant in the 0.2% TOTM group. In the males fed TOTM the higher values for brain weights relative to body weight, in the absence of any significant differences in the recorded weight probably reflect the lower bodyweights in the groups concerned. In the females there were statistically significant higher lung weights in the rats fed 0.2 or 0.67% TOTM when compared to the controls. In the case of the TOTM treated animals this difference was not dose related and not statistically significant when expressed relative to bodyweight.

Serum analyses: Analysis of serum from the males and females showed statistically significantly increased levels of albumin in the groups given 0.67 or 2.0% TOTM (104 to 108% of control). In the males there were statistically significantly higher cholesterol levels in the 0.67 and 2.0% TOTM groups (115 to 125% of control). Concentration of serum urea was statistically significantly increased in the male 2.0% TOTM group to the control value (115%). In the females there was also an isolated statistically significantly lower value for lipid concentration in the 0.2% TOTM group (83% of control).

Liver Biochemistry: TOTM treatment did not influence to a statistically significant degree the concentration of hepatic protein. After TOTM treatment PCoA activity was statistically significantly higher than controls in both sexes at the highest dose and in the males at the lower two doses (133 to 237% of control). In the groups given TOTM only the highest dose level males had statistically significant increases of catalase level (165% of control). Both sexes given 0.67 or 2.0% TOTM had statistically significantly increased carnitine acetyltransferase activity with little difference between the two sexes (262 to 1002% of control).

Histopathology: No abnormalities were detected in the majority of the animals. The only lesions occurring with any frequency were focal interstitial pneumonitis and nephrocalcinosis in the females. The observations were not firmly dose related. The pneumonitis was of limited extent, often only a single focus. Two female rats fed 2.0% TOTM showed reductions in cytoplasmic basophilia in the liver although it was only marginal.

Transmission Electron Microscopy: In the hepatocytes from the control rats the peroxisomes varied in size from small to moderately large. They had uniformly electron dense contents and some possessed a lattice core. They were ubiquitously distributed throughout the cytoplasm. Feeding diet containing 2.0% TOTM produced a slight increase in the numbers of peroxisomes which varied between cells. No difference was seen between the centrilobular and periportal areas.

Test condition : Test Subjects
Age at study initiation: 48-51 days old for males and females.
Weight at study initiation: 137-154g for male; 111-132g for female.
No. of animals per sex per dose: 5 Rats per sex per dose group.

Study Design
Vehicle: Diet
Satellite groups and reasons they were added: None
Clinical observations performed and frequency: Body wt. was recorded immediately prior to the first exposure and again for each animal 1, 3, 7, 10, 14, 17, 21, 24, 27th days. Twice each day the animals were observed in their cages for variations in behaviour or condition, and once weekly a more detailed examination was made at the time of a weighing.
Food intakes were measured over the period day -3 to 0 and continuos intakes were measured at twice-weekly intervals until the day preceding autopsy. The intakes of test article or reference compound for each animal were calculated twice weekly using the analysed dietary concentrations of TOTM or DEHP, and the individual valued for bodyweight and food intake.
Haematologic parameters were evaluated for each animal. On the day preceding the start of the autopsies a sample of blood was collected from a caudal vein of each animal.
Autopsy: At the end of the 28th day treatment period the rats were deprived of food overnight, with water available. On the day of autopsy each animal was weighted and then killed. The blood was used to provide serum for clinical chemistry. During the autopsy any abnormalities of the external condition and of the thoracic or abdominal viscera were noted.
Organs: The weight of the following organs was recorded: adrenal glands, lungs, brain, ovaries, heart, spleen, kidneys, testes, liver and thyroids.
Serum chemistry was performed for each animal. Serum separated from the blood taken prior to autopsy was analyzed.
Liver biochemistry was performed for each animal. Homogenized liver tissues were measured for protein, cyanide-insensitive palmitoyl-CoA, carnitine acetyltranferase and catalase.
Histopathology was made for haematoxylin and eosin stained sections from paraffin embedded samples, of all the preserved tissues.
Transmission electron microscopy: Two thin slices of liver, one from the left lobe, the other from the median lobe, were fixed for analysis. (The remainder of the liver was used for biochemical analysis.)

Test substance : Tris(2-ethylhexyl)benzene-1,2,4-tricarboxylate
Source: Nuoplaz 6959
Purity: 98.2% (GC/FID) 97.9% (HPLC)
Impurities were detected at level than 0.1-0.5%, one being di(2-ethylhexyl) phthalate (DEHP).

Conclusion : The NOAEL for repeated dose toxicity is considered to be 184 mg/kg/day (0.2%) and the LOAEL is considered 650 mg/kg/day (0.67%) for both sexes.

Reliability : (1) valid without restriction
Well conducted study, carried out by the British Industrial Biological Research Associations.

Flag : Critical study for SIDS endpoint

30.03.2006 (3)

Type : Sub-acute
Species : rat
Sex : male/female
Strain : Crj: CD(SD)
Route of admin. : oral feed
Exposure period : 28 day(s)
Frequency of treatm. : once daily
Post exposure period : 2 weeks for 0 and 1,000 mg/kg/day dose
Doses : 0(vehicle), 100, 300 and 1,000 mg/kg/day
Control group : other: Vehicle (corn oil)
Method : other: Guidelines for 28-day Repeated Dose Toxicity Testing of Chemicals (Japan)
Year : 1996
GLP : yes

Test substance : other TS: Tris(2-ethylhexyl)benzene-1,2,4-tricarboxylate

Method : Statistical methods:
Bartlett's test, Dunnett's test or Kruskal-Wallis test depending on whether or not the data were nonhomogeneous or homogeneous. Fisher's test for the pathological result. Jonckheere's test for the correlation of dosage

Remark : Test type: Repeat Dose Toxicity

Vehicle: Corn oil

Duration of test: Males and females; for 28 days

Result : NOAEL: Male: > 1,000 mg/kg/day; Female: > 1,000 mg/kg/day

Body weight: The mean body weight of treatment groups of rats for males and females had no significant differences from the controls during the course of the study.

Food/water consumption: There was no significant difference between control and treatment groups throughout treatment and recovery periods for both sexes.

Clinical signs: No abnormality was detected during the study.

Haematology:
At the end of dosing Males and Females: No dose-related significant changes were observed. In the examination of blood coagulating system, prothrombin time for males was slightly prolonged, but they were considered within the physiological fluctuation. For females, no significant changes in all test items.
After recovering period Males: Haemoglobin was slightly increased for males at 1000mg/kg group, but they were considered within the physiological fluctuation. In the examination of blood coagulation system, no significant changes were observed in all test items.
After recovering period Females: No significant change in all tests.

Biochemistry:
At the end of dosing Males: No dose-related significant adverse treatment-related effect in clinical chemistry.
At the end of dosing Females: At 300, and 1,000 mg/kg dosing, chlorine contents were low.
After recovering period Males: At 1,000 mg/kg dosing, potassium contents were slightly high.
After recovering period Females: At 1,000 mg/kg dosing, GOT were slightly high. But both changes were considered to be no meaning, because at the end of treatment these changes were not recognised.

Urinalysis:
At the end of dosing Males and Females: At 1,000 mg/kg dosing, some of rats (both sexes), amounts of urinary increased, but the mean urinary specific gravity values in the 1,000 mg/kg dosing group was not significant change from control group.
After recovering period Males and Females: No dose-related significant change in all tests.

Mortality and time to death: No deaths prior to scheduled termination.

Organ weight changes:
At the end of dosing Male: No dose-related change in all tested organs.
At the end of dosing Female: Relative liver weight were slightly increased at 100 mg/kg dosing, but no dose-related change. Other organs, no significant change.
After recovering period Males: At 1,000 mg/kg dosing, relative kidney

weight were slightly low.
After recovering period Females: At 1,000 mg/kg dosing, absolute and relative adrenal weight were slightly high. But both changes were considered no related to dosing and recovering of this chemical.

Gross pathlogy and histopathlogy:
At the end of dosing Males: Coloured patch/zone of lungs were observed 1 of 100 mg/kg, 2 of 300 mg/kg and 3 animals of 1,000 mg/kg dosing group. Also hypertrophy of the kidney, hypertrophy of parathyroid, and etc. were observed. Amounts of eosinophilic body in the kidney were slightly increased in dosing group. But all these changes were considered no related the dosing and recovering of this chemical, because the degree and rate of changes were same of all the group included control.
At the end of dosing Females: Red patch/zone of thymus dilated lumen of the uterus and etc. were observed. But all these changes were considered no related the dosing and recovering of this chemical, because the degree and rate of changes were same of all the group included control.
After recovering period Males and Females: No dose-related significant change in all tests.

Test condition : Test Subjects
Age at study initiation: 6 weeks old for males and females.
Weight at study initiation: 130-151g for male; 110-121g for female.
No. of animals per sex per dose: 5 Rats per sex per dose group

Study Design
Vehicle: Corn oil
Satellite groups and reasons they were added: None
Clinical observations performed and frequency: Body weights were recorded immediately prior to the first exposure and again for each animal every week.
Haematologic parameters were evaluated for each animal. Blood samples for the haematologic determinations were taken from abdominal artery in rats after 16 hr fast.
Clinical chemistry analyses were performed on serum samples from each animal.
Urinalyses were performed for each rat. Urine samples were collected from each rat on the day prior to scheduled termination.
Organ weights: brain, liver, kidneys, spleen, adrenals, testes (male) and ovaries (females) for each animal.
Histopathology: heart, liver, kidneys, spleen, adrenals and femoral bone marrow from rats of the control and high dosed groups, and kidneys from all dosage male.

Test substance : Tris(2-ethylhexyl)benzene-1,2,4-tricarboxylate
Source: Daihachi Kagaku Kogyo Co., Ltd. Lot. No. N-60601
Purity: >99.0% Kept at room temperature in a dark place until use.

Conclusion : No test substance related changes were noted in terms of clinical signs, body weight, food consumption, and haematology, blood chemical examination, urinalysis, and pathological findings. The NOEL for repeated dose toxicity is considered to be 1,000 mg/kg/day for both sexes.

Reliability : (1) valid without restriction
Well conducted study, carried out by the Biosafety Research Center, Food, Drugs and Pesticides (An-pyo Center), Japan.

Flag : Critical study for SIDS endpoint
30.03.2006 (15)

5.5 GENETIC TOXICITY 'IN VITRO'

Type : Ames test
System of testing : Bacterial
Test concentration : 100, 333, 1000, 3333, 10000 mg/ml.

Cycotoxic concentr.	:	> 10,000 µg/plate
Metabolic activation	:	with and without
Result	:	negative
Method	:	OECD Guide-line 471
Year	:	1988
GLP	:	yes
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester (CAS No. 3319-31-1)
Method	:	Chemicals were judged to be mutagenic if the test results produced a dose-related, reproducible increase in histidine revertants over control. It was not a requirement for mutagenic responses to reach two-fold over background.
Test condition	:	Prior to assay initiation, a toxicity pretest was performed using tester strain TA100. Based on these results, the doses for the final assay were determined. Each chemical was tested initially at half-log dose intervals up to a dose that elicited toxicity, or to a dose immediately below one which was toxic in the preliminary toxicity test. Chemicals that were not toxic were tested, with few exceptions, to a maximum dose of 10 mg/plate. In the definitive assay, each of the five strains was dosed with either the test substance; a vehicle control (DMSO); or a nontreated control and a positive control. The test mixture containing the tester strain and test substance with or without S9 was added to the surface of petri dishes containing Vogel-Bonner medium. The S-9 (9,000g supernatant) fractions of Aroclor 1254-induced, male Sprague-Dawley rat and male Syrian hamster livers were prepared as described previously [Haworth et al, 1983]. The S-9 mixes were prepared immediately prior to use and contained either 10% or 30% S-9; occasionally, other levels were used. The histidine-independent colonies that formed on the plates were counted following a two-day incubation at 37°C. Positive controls were as follows: 2-aminoanthracene (all strains with S9); sodium azide (without S9, TA1535, TA100), 4-nitro-o-phenylenediamine (without S9, TA98) and 9-aminoacridine (without S9, TA 97, TA1537). There were 3 plates/dose group/strain/treatment. The test results were verified by repeating the assay. If the results were negative, they were repeated first without S9 and then with 30% S9.
Test substance	:	CAS #3319-31-1; 1,2,4-Benzenetricarboxylic acid, tris(2-ethylhexyl) ester
Conclusion	:	Under the conditions of this study, tri (2-ethylhexyl) trimellitate was not mutagenic at doses up to 10,000 mg/ml.
Reliability	:	(1) valid without restriction
Flag	:	Critical study for SIDS endpoint

30.03.2006 (5)

Type	:	Bacterial reverse mutation assay
System of testing	:	
Test concentration	:	(see Freetext)
Cycotoxic concentr.	:	(see Freetext)
Metabolic activation	:	with and without
Result	:	negative
Method	:	other: Guideline for Screening Mutagenicity Testing of Chemicals (Japan) and OECD TG 471 and 472
Year	:	1996
GLP	:	yes
Test substance	:	other TS: Tris(2-ethylhexyl)benzene-1,2,4-tricarboxylate
Method	:	Statistical methods: No statistical analysis was done.
Remark	:	Species/Strain: Salmonella typhimurium TA100, TA1535, TA98, TA1537; Escherichia coli WP2 uvrA Positive controls: -S9 mix, 2-(2-Furyl)-3-(5-nitro-2-furyl)acrylamide (TA100, WP2, TA98) Sodium azide (TA1535)

9-Aminoacridine (TA 1537)
+S9 mix, 20Aminoanthracene (five strains)

S9: Rat liver, induced with phenobarbital and 5,6-benzoflavone

Result : Cytotoxic concentration: Toxicity was not observed up to 5,000 ug/plate in five strains with and without metabolic activation (S9 mix).

Genotoxic effects:

	+	?	-
With metabolic activation:	[ ]	[ ]	[x]
Without metabolic activation:	[ ]	[ ]	[x]

Test condition : Study Design
Concentration: -S9: 0, 313, 625, 1,250, 2,500, 5,000 ug/plate (five strains)
+S9: 0, 313, 625, 1,250, 2,500, 5,000 ug/plate (five strains)
Number of replicates: 2
Plates/test: 3
Procedure: Plate incorporation method
Solvent: Acetone

Test substance : Tris(2-ethylhexyl)benzene-1,2,4-tricarboxylate
Source: Daihachi Kagaku Kogyo Co., Ltd. Lot. No. N-60601
Purity: >99.0% Kept at room temperature in a dark place until use.

Conclusion : Bacterial gene mutation is negative with and without metabolic activation.

Reliability : (1) valid without restriction
Well conducted study, carried out by Hatano Research Institute, Food and Drug Safety Center (Hadano, Japan).

Flag : Critical study for SIDS endpoint

17.02.2006 (15)

Type : Chromosomal aberration test
System of testing :
Test concentration : (see Freetext)
Cycotoxic concentr. : (see Freetext)
Metabolic activation : with and without
Result : negative
Method : other: Guideline for Screening Toxicity Testing of Chemicals (Japan)
Year : 1996
GLP : yes
Test substance : other TS: Tris(2-ethylhexyl)benzene-1,2,4-tricarboxylate

Method : Statistical methods: Fisher's exact analysis.
Remark : Species/Strain: CHL/IU cell

Metabolic activation: with and without S9 from rat liver, induced with phenobarbital and 5,6-benzoflavone.

Result : Cytotoxic concentration:
Toxicity was not observed up to 5.0 mg/ml in continuous and short-term treatment with or without S9 mix.

Genotoxic effects:

	Clastogenicity			Polyploidy		
	+	?	-	+	?	-
With metabolic activation:	[ ]	[ ]	[x]	[ ]	[ ]	[x]
Without metabolic activation:	[ ]	[ ]	[x]	[ ]	[ ]	[x]

Test condition : Study Design
For continuous treatment, cells were treated for 24 or 48 hrs without S9.
For short-term treatment, cells were treated for 6 hrs with and without S9 and cultivated with fresh media for 18 hrs.
Concentration:
-S9 (continuous treatment): 0, 1.3, 2.5, 5.0 mg/mL
-S9 (short-term treatment): 0, 1.3, 2.5, 5.0 mg/mL

+S9 (short-term treatment): 0, 1.3, 2.5, 5.0 mg/mL
Plates/test: 2
Solvent: Acetone
Positive controls: Mitomycin C for continuous treatment
Cyclophosphamide for short-term treatment

Test substance : Tris(2-ethylhexyl)benzene-1,2,4-tricarboxylate
Source: Daihachi Kagaku Kogyo Co., Ltd. Lot. No. N-60601
Purity: >99.0% Kept at room temperature in a dark place until use.

Conclusion : Chromosomal aberration in CHL/IU cells is negative with and without metabolic activation.

Reliability : (1) valid without restriction
Well conducted study, carried out by Hatano Research Institute, Food and Drug Safety Center (Hadano, Japan).

Flag : Critical study for SIDS endpoint

17.02.2006 (15)

5.6 GENETIC TOXICITY 'IN VIVO'

5.7 CARCINOGENICITY

5.8.1 TOXICITY TO FERTILITY

5.8.2 DEVELOPMENTAL TOXICITY/TERATOGENICITY

5.8.3 TOXICITY TO REPRODUCTION, OTHER STUDIES

Type : other: Preliminary reproduction toxicity screening test
In vitro/in vivo :
Species : rat
Sex : male/female
Strain : Crj: CD(SD)
Route of admin. : gavage
Exposure period :
Frequency of treatm. : once daily
Duration of test :
Doses : 0(vehicle), 100, 300, 1,000 mg/kg/day
Control group : other: Vehicle (corn oil)
Result : (see Results Freetext)
Method : other: OECD Preliminary reproductive toxicity screening test
Year : 1998
GLP : yes
Test substance : other TS: Tris(2-ethylhexyl)benzene-1,2,4-tricarboxylate

Method : Statistical methods:
Chi square test for 1 grade positive data and Fisher's test for another. Bartlett's test or Kruskal-Wallis' test for 2 or more grade positive data. And used Dunnett's test or Mann-Whitney's U-test for examination.

Remark : Vehicle: Corn oil

Administration period: Males for 46 days from 2 weeks prior to mating; Females from 2 weeks prior to mating to day 3 of lactation

Post exposure observation period: None

Result :

Terminal kill: Males day 47; Females day 4 of lactation
Repeat dose toxicity:
NOEL 100 mg/kg/day for males and 1,000 mg/kg/day for females

Reproductive and developmental toxicity:
NOEL 100 mg/kg/day for males
1,000 mg/kg/day for female
1,000 mg/kg/day for offspring

Mortality and day of death: None.

Body weight: No statistical significant difference from controls.

Food/water consumption: No statistical significant difference from controls.

Reproductive data: No statistical significant difference from controls.

Pups data: Body weight and weight gain of 300 mg/kg dosing group for both sexes were slightly low. But all pups of 100 and 1000 mg/kg dosing group were not statistical significant difference from controls.
At the other tests, no statistical significant difference from controls.

Grossly visible abnormalities, external, soft tissue and skeletal abnormalities:
For Males:
Slightly decrease of spermatocytes and spermatids: 2 animals of 300 mg/kg dosing group. 11 of 1000 mg/kg dosing group.
Moderate decrease of spermatocytes and spermatids: 1 of 1000 mg/kg/dosing group. At this animal, a few multinucleate giant cell were appeared and slightly vacuolization of sertoli sells were observed. Also, at the epididymis, moderate amount of cell debris moderate decrease of spermatids and slightly granuloma of spermatic were observed.
For the control group, atrophy of seminiferous tubule were observed 2 animals. At these animals, slightly amount of cell debris were observed. one of these animals, slight decrease of spermatids was also observed.
Number of cells in seminiferous tubules:
Group 1(Stage I-VI): Low value of spermatids at 300 mg/kg dosing group. Low values of spermatocytes and spermatids at 1000 mg/kg dosing group.
Group 2(Stage VII-VIII): Low values of round spermatids and ratio of sertoli cells at 1000 mg/kg.
Group 3(stage IX-XI): Low values of elongate spermatids and ratio of sertoli cells at 1000 mg/kg.
Group 4(stage XII-XIV): Low values of spermatocytes, elongate spermatids, and ratio of sertoli cells at 1000 mg/kg dosing group.
For females:
Cyst of corpus luteum of ovary was observed 2 animals of 300 mg/kg dosing group. No abnormal ovary observed at the female of 100 mg/kg dosing without successful copulation, females of control and 100 mg/kg dosing without pregnant.

Histopathological finding in rats

	dose (mg/kg)			
Items	0	100	300	1,000
No. of male animals examined	12	12	12	12
Organ: Findings				Grade
Testis:				
Decrease, spermatocyte and spermatid Total	0	0	2	12**
+	0	0	2	11
++	0	0	0	1
Multinuclear giant cell, seminiferous tubule +	0	0	0	1

Vacuolozation, Sertoli cell + 0 0 0 1
Atrophy, seminiferous tubule + 2 0 0 0
Epididymis:
Cell debris, lumen Total 2 0 0 1
+ 2 0 0 0
++ 0 0 0 1
Decrease, sperm Total 1 0 0 1
+ 1 0 0 0
++ 0 0 0 1
Granuloma, spermatic + 0 0 0 1
No. of female animals examined 12 12 12 12
Ovary:
Cyst, corpus luteum <+> 0 0 2 0

Values are no, of animals with finding.
Grade: +=slight, ++=moderate change and <+>=detected
Significantly different from 0 mg/kg group: **:p<0.01.

Number of cells in seminiferous tubules of male rats.

Items	dose (mg/kg) 0	100	300	1,000
No. of animals examined	5	5	5	5
Group 1 (Stage I-VI)				
No. of Sertoli cells	20.12(3.18)	19.08(1.49)	18.52(1.45)	18.08(1.45)
Spermatogonia No.	16.80(5.65)	20.52(2.58)	18.48(3.17)	15.76(2.61)
ratio a)	0.85(0.29)	1.08(0.19)	1.01(0.21)	0.87(0.11)
Spermatocytes No.	50.80(7.44)	51.80(4.84)	42.64(2.63)	40.84(5.63)*
ratio	2.53(0.13)	2.72(0.26)	2.37(0.24)	2.25(0.16)
Round spermatids No.	138.36(17.20)	128.00(8.89)	117.68(5.59)*	112.60(3.11)**
ratio	6.91(0.35)	6.75(0.84)	6.39(0.70)	6.26(0.48)
Elongate spermatids No.	130.00(21.71)	132.32(11.17)	103.28(12.34)*	95.36(8.44)**
ratio	6.53(1.15)	6.98(0.88)	5.62(0.90)	5.30(0.69)
Group 2 (Stage VII-VIII)				
No. of Sertoli cells	16.96(2.63)	17.04(2.17)	16.64(2.73)	16.52(2.23)
Spermatogonia No.	2.92(1.06)	2.40(0.93)	2.04(0.68)	2.60(1.10)
ratio	0.18(0.09)	0.14(0.05)	0.12(0.03)	0.16(0.06)
Spermatocytes No.	91.68(10.37)	94.68(6.55)	84.44(6.99)	82.32(6.70)
ratio	5.45 (0.56)	5.60(0.51)	5.16(0.79)	5.03(0.54)
Round spermatids No.	142.08(13.39)	131.64(13.72)	123.96(8.23)	118.76(8.28)*
ratio	8.45(0.62)	7.75(0.39)	7.66(1.66)	7.25(0.62)*
Elongate spermatids No.	129.24(17.37)	128.32(16.88)	114.72(9.80)	105.65(13.47)
ratio	7.78(1.54)	7.56(0.72)	7.09(1.62)	6.46(1.05)

Group 3 (Stage VII-VIII)
No. of Sertoli cells
19.28(1.92) 20.52(1.55) 19.20(1.58) 19.32(2.18)
Spermatogonia No.
4.52(1.32) 4.20(1.50) 4.92(1.63) 3.32(1.02)
ratio
0.23(0.05) 0.21(0.08) 0.26(0.11) 0.18(0.05)
Spermatocytes No.
102.52(10.83) 99.08(8.42) 97.56(4.50) 89.04(9.00)
ratio
5.34(0.56) 4.85(0.50) 5.10(0.36) 4.62(0.32)
Elongate spermatids No.
145.24(11.01) 130.64(9.90)) 131.68(19.71) 119.24(15.90*
ratio
7.56(0.61) 6.37(0.23) 6.88(1.04) 6.21(0.83)*

Group 4 (Stage VII-VIII)
No. of Sertoli cells
19.16(2.81) 20.92(1.73) 18.64(1.72) 16.72(0.92)
Spermatogonia No.
4.04(0.89) 3.72(0.72) 3.64(0.48) 3.64(0.71)
ratio
0.21(0.05) 0.18(0.03) 0.20(0.02) 0.22(0.05)
Spermatocytes No.
109.80(13.15) 110.36(9.22) 99.44(4.54) 88.76(4.33)**
ratio
5.76 (0.29) 5.28(0.12) 5.36(0.34) 5.32(0.46)
Elongate spermatids No.
159.76(15.91) 150.28(18.99) 137.08(17.70) 105.16(18.34)**
ratio
8.39(0.63) 7.19(0.71) 7.35(0.62) 6.33(1.31)**

Values are expressed as Mean(S.D.)
Significantly different from 0 mg/kg group; * $p<0.05$, ** $p<0.01$
a): (No. of spermatogenic cells/no. of sertoli cells in a seminiferous tubule)

Influence on reproductive performances of rats

Items	dose (mg/kg) 0	100	300	1,000
No. of male animals examined	12	12	12	12
No. of pairs with successful copulation	12	12	12	12
Duration of mating (day, Mean, (SD))	2.1(1.2)	2.3(1.3)	2.7(1.2)	2.7(1.1)
Copulation index(%)*	100.0	91.7	100.0	100.0
No. of pregnant animals	11	10	12	12
Fertility index(%)**	91.7	90.9	100.0	100.0

*(No.of pairs with successful copulation/no.of pairs mated) x 100
**(No. of pregnant animals/no.of pairs with successful copulation) x 100

Influence on developmental performances of rats

Items	dose (mg/kg) 0	100	300	1,000
No. of male animals examined	12	12	12	12

No. of corpora lutea
16.8(1.5) 17.3(1.3) 17.0(2.3) 17.9(2.2)
No. of implantation sites
15.5(1.7) 16.6(1.3) 16.0(2.0) 16.3(2.3)
Implantation index(%) a)
92.5(7.2) 96.2(6.6) 94.5(8.4) 91.3(8.8)
No. of pups born(%)
13.7(3.1) 15.0(1.7) 15.0(1.8) 15.1(2.7)
Delivery index(%) b)
87.6(15.4) 90.3(6.8) 94.1(7.2) 92.2(9.6)
Live pups born No.
13.3(2.9) 14.7(2.0) 14.9(2.0) 15.0(2.7)
Live birth index(%) c)
97.1(5.6) 97.8(3.6) 99.2(2.6) 99.4(2.1)
Sex ratio(M/F)
1.09(0.69) 1.05(0.50) 1.17(0.75) 0.76(0.44)
Dead pups born No.
0.5(0.9) 0.3(0.5) 0.1(0.3) 0.1(0.3)
Gestation length(day)
22.7(0.5) 22.7(0.5) 22.5(0.5) 11.6(0.5)
Gestation index(%) d)
100.0 100.0 100.0 100.0
Nursing index(%) e)
100.0 100.0 100.0 100.0
Live pups on day 4 No.
13.2(2.8) 14.6(2.1) 14.4(2.9) 14.5(2.9)
Viability index(%) f)
99.5(1.8) 99.3(2.3) 95.6(11.5) 96.7(6.7)
Body weight of pups(g)
Male Day 0
7.32(0.77) 7.13(0.52) 6.69(0.55) 6.87(0.84)
Day 4
11.71(1.76) 11.09(0.93) 10.23(0.98)* 10.60(1.47)
Day 0-4, gain(g)
4.39(1.04) 3.96(0.53) 3.54(0.77)* 3.73(0.80)
Body weight gain(%) g)
59.41(8.87) 55.54(6.16) 53.19(11.91) 54.39(9.50)
Female Day 0
6.93(0.83) 6.63(0.64) 6.33(0.58) 6.58(0.62)
Day 4
11.08(1.71) 10.28(1.01) 9.84(1.01)* 10.03(1.46)
Day 0-4, gain(g)
4.16(1.00) 3.65(0.56) 3.14(0.79)* 3.46(0.96)
Body weight gain(%)
59.63(10.42) 55.24(8.07) 49.95(13.09) 52.17(11.10)

Values are expressed as Mean (S.D.)
Significantly difference from 0 mg/kg group ; p?0.05
a): (No. of implantation sites/no. of corpora lutea) x 100
b): (No. of pups born/no. of implantation sites) x 100
c): (No. of live pups born/no. of pups born) x 100
d): (No. of females with live pups delivered/ no. of pregnant remales) x 100
e): (No. of females nursing live pups/no. of females with normal delivery) x 100
f): (No. of live pups on day 4/ no. of live pups born) x 100
g): (Body weight gain/body weight on day 0) x 100

Test condition : Test Subjects
Age at study initiation: 10 week old for both sexes.
Weight at study initiation: 373-435 g for males, 217-257 g for females
No. of animals per sex per dose: 12 per sex per dose group

Study Design

The animals were sacrificed on the day 4 of lactation for females.
Males and females with no mated were killed 1 day after the mating period.
Females with no delivery killed 26th day of gestation period.
Vehicle: Corn oil
Satellite groups and reasons they were added: None
Mating procedures: Male/female per cage; 1/1, length of cohabitation; with in the limit of 14 days until proof of pregnancy (formation sperm detection in vagina) was observed.

Clinical observations performed and frequency:
Parent: General appearance once a day
Foetus: General appearance once a day after birth

Organs examined at necropsy:
Parent: Males and females: Gross pathlogy of all organs were tested.
Males: Organ weight: Testis and epididymis of all animals.
Female: Organ weight: Ovary of all animals.
Count: Implantation sites and corpus luteum of ovary of all animals.
Microscopic:
Males: Testis and epididymis. Count of sertoli sells, spermatocytes, round spermatids and elongate spermatids in seminiferous tubules of 5 animals of all dosing groups.(Stage I-VI, VII-VIII, IX-XI, XII-XIV of spermatozoon formative cycle.)
Females: Ovary
Pup: Gross pathlogy of all organs were tested. Dead pups and abnormal organs were tested histopathogy.

Parameters assessed during study:
Body weight. Males: Prior to the first dosing and 2, 5, 7, 10, 14 day. After that once a week, the day sacrificed. Females: Prior to the first dosing and 2, 5, 7, 10, 14 day. During gestation period, 0, 1, 3, 5, 7, 10, 17 and 20 day. During lactation period, 0, 1, and 4. During cohabitation period, the same day with male. Pups: Day 0 and 4
Food/water consumption. The same day when body wt. determined, except lactation period and the day sacrificed for males, also, 0 day of gestation and lactation for female.
No. of pairs with successful copulation, copulation index (No. of pairs with successful copulation/No. of pairs mated) x 100, duration of mating, No. of pregnant females, fertility index = (No. of pregnant animals/No. of pairs with successful copulation) x 100, No. of corpora lutea, No. of implantation sites, implantation index (No. of implantation sites/No. of corpora lutea) x 100, No. of pups born, delivery index (No. of pups born/No. of implantation sates)x 100, No. of love pups born, live birth index (No. of love pups born/No. of pups born) x 100, sex ratio of pups, No. of dead pups born, gestation length, gestation index (No. of females with live pops delivered/ No. of pregnant females) x 100, nursing index (No. of females nursing live pups/No. of females with normal delivery) x 100, No. of live pups on day 4, viability index (No. of live pups on day 4/No. of live pups born) x 100.

Test substance : Tris(2-ethylhexyl)benzene-1,2,4-tricarboxylate
Source: Daihachi Kagaku Kogyo Co., Ltd. Lot. No. N-80301
Purity: >99.0% Kept at room temperature in a dark place until use.

Conclusion : Repeat dose toxicity
Histopathological examination of the testes, demonstrated decrease of spermatocytes and spermatids in males of the 300 and 1000 mg/kg group.
No effects of this chemical on general appearance, body weight, food consumption, autopsy findings, weights of the reproductive organs of both sexes, or histopathlogical features of the ovary were detected.
The NOELs are considered to be 100 mg/kg/day for males, and 1,000 mg/kg/day for females.

Reproductive and developmental toxicity
Except for the effects in males observed on histopathological examination,

no influence of this chemical was detected regarding reproductive ability, organ weight or histopathological feature of the ovary, delivery or maternal behaviour of dams. No effects of this chemical were detected on viability, general appearance, body weights or autopsy findings for offspring.
The NOELs are considered to be 100 mg/kg/day for males, 1,000 mg/kg/day for females, and 1,000 mg/kg/day for offspring.

Reliability : (1) valid without restriction
Well conducted study, carried out by the Safety Research Institute for Chemical Compounds Co., Ltd. (Japan).

Flag : Critical study for SIDS endpoint

06.03.2006 (16)

5.9 SPECIFIC INVESTIGATIONS

5.10 EXPOSURE EXPERIENCE

5.11 ADDITIONAL REMARKS

6.1 ANALYTICAL METHODS

6.2 DETECTION AND IDENTIFICATION

7.1 FUNCTION

7.2 EFFECTS ON ORGANISMS TO BE CONTROLLED

7.3 ORGANISMS TO BE PROTECTED

7.4 USER

7.5 RESISTANCE

8.1 METHODS HANDLING AND STORING

8.2 FIRE GUIDANCE

8.3 EMERGENCY MEASURES

8.4 POSSIB. OF RENDERING SUBST. HARMLESS

8.5 WASTE MANAGEMENT

8.6 SIDE-EFFECTS DETECTION

8.7 SUBSTANCE REGISTERED AS DANGEROUS FOR GROUND WATER

8.8 REACTIVITY TOWARDS CONTAINER MATERIAL

(1) ABC Laboratories (1986). Shake Flask Biodegradation of 14C-Tris (2-ethylhexyl) Trimellitate (TOTM). ABC Final Report No. 31891. Sponsored by CMA. Performed by: ABC Laboratories Columbia, MO.

(2) BASF (2001). Technical Data Sheet for Palatinol TOTM.

(3) Chemical Manufacturers Association (1985). Project No. 3.0496. Report No. 0496/1/85, CMA Reference. TM-3.0-BT-BIB.

(4) Chemical Manufacturers Association (CMA) (1985). Chronic toxicity of tris(2-ethylhexyl) trimellitate to Daphnia magna under flow-through conditions. OTS 0510636. Doc ID 408565036. CMA, Arlington, VA, USA.

(5) E. Zeiger, B. Anderson, S. Haworth, T. Lawlor and K. Mortelmans. (1988). Salmonella mutagenicity tests. IV. Results from the testing of 300 chemicals. Environmental and Molecular Mutagenesis 11(12):1-158 .

(6) Environmental Agency of Japan (1999a). Ecotoxicity testing report. Test No. NMMP/E09/1080.

(7) Environmental Agency of Japan (1999b). Ecotoxicity testing report. Test No. NMMP/E09/2080.

(8) Environmental Agency of Japan (1999d). Ecotoxicity testing report. Test No. NMMP/E09/4080.

(9) Environmental Agency of Japan (1999d). Ecotoxicity testing report. Test No. NMMP/E09/5080.

(10) EPI SuiteTM (2000). Estimation Program Interface Suite, v3.12. Syracuse Research Corporation, Syracuse, NY, USA.

(11) ExxonMobil Biomedical Sciences, Inc. (2005). Ready Biodegradability: OECD 301F Manometric Respirometry Test. Study No. 0533179.

(12) Mackay D (1998). Level III Fugacity-Based Environmental Equilibrium Partitioning Model, Version 2.1 (16-bit). Environmental Modelling Centre, Trent University, Ontario, Canada.

(13) Manufacturer Safety Data Sheet

(14) Ministry of Health & Welfare, Japan (1996). Toxicity Testing Reports of Environmental Chemicals, Vol. 4.

(15) Ministry of Health & Welfare, Japan (1996). Toxicity Testing Reports of Environmental Chemicals, Vol.4.

(16) Ministry of Health & Welfare, Japan (1998). Toxicity Testing Reports of Environmental Chemicals, Vol.6.

(17) Nuodex Inc. (1981). Acute dermal toxicity test of Tenneco Chemicals Inc. compound Nouplaz 6959 in rabbit. Environmental Protection Agency.

(18) Nuodex Inc. (1983). Acute inhalation toxicity test in Sprague-Dawley rats using compound Nouplaz 6959. Environmental Protection Agency.

(19) Wilson, A., (1996). Plasticizers - Selection, Applications and Implications. Rapra Review Reports 8:15-16.

10.1 END POINT SUMMARY

10.2 HAZARD SUMMARY

Remark : Because of the similarity in chemical structure, the Panel believes that the toxicological properties of the substances in this category will be similar as well. Thus, the Panel considers that the data for the best tested member of this category, tris-2-(ethylhexyl) trimellitate (TOTM), also represents the potential for human and environmental effects of the other members of this category.

TOTM has been sponsored under the OECD SIDS program through ICCA. A review of the available data for TOTM (see attached Table) indicates that all endpoints have been adequately addressed, and that TOTM exhibits a low order of toxicity.

Due to their higher molecular weight and bulky side chains, the remaining members of this category are expected to demonstrate a lower order of toxicity than TOTM. This is supported by a similar structural-activity relationship observed with phthalate ester compounds, i.e., the higher molecular weight phthalates (ester side chains >C7) are less active that the transitional phthalates (ester side chains C4-C6). Thus, the use of TOTM to represent the potential hazards of the other category members is a conservative position.
Chapters 4 & 5

Attached document : Summary of SIDS Information on Trimellitates.doc
Flag : confidential, Critical study for SIDS endpoint
21.02.2006

Attached document : 2xasset.Log
21.02.2006

10.3 RISK ASSESSMENT

Memo : SIDS Initial Assessment Profile (SIAP), SIDS Initial Assessment Report (SIAR) and Robust Summary for TOTM -- submitted by Japan under ICCA HPV program.

Attached document : TOTM_SIAR.pdf
Flag : Critical study for SIDS endpoint
17.02.2006

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IUCLID

Data Set

Existing Chemical	:	ID: 27251-75-8
Memo	:	HPV Chemical
CAS No.	:	27251-75-8
TSCA Name	:	1,2,4-benzenetricarboxcylic acid, triisooctyl ester
Generic name	:	triisooctyl ester trimellitate

Producer related part

Company	:	ExxonMobil Biomedical Sciences Inc.
Creation date	:	26.10.2000

Substance related part

Company	:	ExxonMobil Biomedical Sciences Inc.
Creation date	:	26.10.2000
Status	:	
Memo	:	ACC Phthalate Esters HPV Panel
Printing date	:	23.02.2006
Revision date	:	
Date of last update	:	23.02.2006
Number of pages	:	21
Chapter (profile)	:	Chapter: 1, 2, 3, 4, 5, 6, 7, 8, 10
Reliability (profile)	:	Reliability: without reliability, 1, 2, 3, 4
Flags (profile)	:	Flags: without flag, confidential, non confidential, WGK (DE), TA-Luft (DE), Material Safety Dataset, Risk Assessment, Directive 67/548/EEC, SIDS

1.0.1 APPLICANT AND COMPANY INFORMATION

Type	:	lead organisation
Name	:	ACC Phthalate Esters Panel HPV Testing Group
Contact person	:	Dr. Marian Stanley
Date	:	
Street	:	1300 Wilson Blvd.
Town	:	22209 Arlington, VA
Country	:	United States
Phone	:	(703) 741-5623
Telefax	:	(703) 741-6091
Telex	:	
Cedex	:	
Email	:	
Homepage	:	

Remark : The American Chemistry Council Phthalate Esters Panel sponsoring this test plan includes the following member companies:

Eastman Chemical Company
ExxonMobil Chemical Company
Sunoco Chemicals
Teknor Apex Company

21.02.2006

1.0.2 LOCATION OF PRODUCTION SITE, IMPORTER OR FORMULATOR

1.0.3 IDENTITY OF RECIPIENTS

1.0.4 DETAILS ON CATEGORY/TEMPLATE

Comment : This chemical is part of the Trimellitate category. The category includes the following four CAS numbers: 3319-31-1, 27251-75-8, 53894-23-8 and 67989-23-5.

Remark : DESCRIPTION OF THE TRIMELLITATES CATEGORY

The trimellitates comprise a family of chemicals synthesized by esterifying trimellitic anhydride with alcohols with average carbon numbers ranging from approximately C7-C10, in the presence of an acid catalyst. The category includes the four trimellitates: 3319-31-1 (TOTM), 27251-75-8 (TIOTM),
53894-23-8 (TINTM), and 67989-23-5 (DOTM). Trimellitates in this category are all 1,2,4-benzenetricarboxylic acids with side chain ester groups ranging from C8 to C10. The structural formula for trimellitates varies somewhat depending on the isomeric composition of the alcohols used in their manufacture. The specific alcohols used are 2-ethylhexanol (TOTM), iso-octyl alcohol (TIOTM), iso-nonyl alcohol (TINTM), and a mixture of linear and branched decyl (40%) and octyl (60%) alcohols (DOTM).

Trimellitates are colorless to slightly yellow liquids with high boiling points (> 250oC) and low vapor pressures; properties which contribute to their

high physical stability. They are readily soluble in most organic solvents and miscible with alcohol, ether and most oils, but essentially insoluble in water. Because of the similarity in structure as well as physicochemical properties, the trimellitates were grouped into a single category containing four substances with carboxylic side chain ester groups ranging from C8-C10.

21.02.2006

1.1.0 SUBSTANCE IDENTIFICATION

1.1.1 GENERAL SUBSTANCE INFORMATION

Purity type	:	
Substance type	:	organic
Physical status	:	liquid
Purity	:	
Colour	:	
Odour	:	

Remark : The products described within this document are the result of a reaction between alcohols and trimellitic anhydride. This reaction is carried to completion and typically 99% or greater of the starting substances are converted to product. Consequently, the only other substances in the final product include very small amounts of free alcohol and trimellitic acid. All testing has been performed on the commercial grade substances without any additive, unless specifically indicated.

21.02.2006

1.1.2 SPECTRA

1.2 SYNONYMS AND TRADENAMES

1.3 IMPURITIES

1.4 ADDITIVES

1.5 TOTAL QUANTITY

1.6.1 LABELLING

1.6.2 CLASSIFICATION

1.6.3 PACKAGING

1.7 USE PATTERN

Type of use : industrial
Category : Polymers industry

Remark : Trimellitates are used predominantly as plasticizers for production of flexible PVC. Because of their relatively high molecular weight (>500 g/mole) and bulky structure, they have lower volatility and greater resistance to migration than the corresponding phthalate ester plasticizers. They are predominantly used in the manufacture of high temperature PVC cables (Wilson, 1996). Since these chemicals are produced in closed systems, there is essentially no occupational exposure to these substances except at the flexible PVC production facility. Usually, these substances have been already blended to the compound as plasticizer, so it is not expected that downstream users or consumers are directly exposed to trimellitates.

21.02.2006 (4)

1.7.1 DETAILED USE PATTERN

1.7.2 METHODS OF MANUFACTURE

1.8 REGULATORY MEASURES

1.8.1 OCCUPATIONAL EXPOSURE LIMIT VALUES

1.8.2 ACCEPTABLE RESIDUES LEVELS

1.8.3 WATER POLLUTION

1.8.4 MAJOR ACCIDENT HAZARDS

1.8.5 AIR POLLUTION

1.8.6 LISTINGS E.G. CHEMICAL INVENTORIES

1.9.1 DEGRADATION/TRANSFORMATION PRODUCTS

1.9.2 COMPONENTS

1.10 SOURCE OF EXPOSURE

1.11 ADDITIONAL REMARKS

1.12 LAST LITERATURE SEARCH

1.13 REVIEWS

2.1 MELTING POINT

Value	:	= 197 °C
Decomposition	:	no, at °C
Sublimation	:	no
Method	:	other
Year	:	
GLP	:	
Test substance	:	other TS: 1,2,4-Benzenetricarboxcylic acid, triisooctyl ester (CAS No. 27251-75-8)
Method	:	Melting point calculation by MPBPWIN ver. 1.41 using calculation methods of Joback and Gold and Ogle.
Remark	:	EPI SuiteTM is used and advocated by the US EPA for chemical property estimation. Melting point calculation seems to give erroneously high results for this class of chemicals. Melting point calculation seems to give erroneously high results for the this class of chemicals.
Test substance	:	CAS #27251-75-8; 1,2,4-Benzenetricarboxcylic acid, triisooctyl ester
Reliability	:	(3) invalid

21.02.2006 (1)

2.2 BOILING POINT

Value	:	= 541 °C at 1013 hPa
Decomposition	:	no
Method	:	other
Year	:	
GLP	:	
Test substance	:	other TS: 1,2,4-Benzenetricarboxcylic acid, triisooctyl ester (CAS No. 27251-75-8)
Method	:	Boiling point calculation by MPBPWIN ver. 1.41 using calculation method of Stein and Brown.
Remark	:	EPI SuiteTM is used and advocated by the US EPA for chemical property estimation.
Test substance	:	CAS #27251-75-8; 1,2,4-Benzenetricarboxcylic acid, triisooctyl ester
Reliability	:	(2) valid with restrictions This robust summary is assigned a reliability of 2 because there is limited informtion on how the data were developed.
Flag	:	Critical study for SIDS endpoint

21.02.2006 (1)

2.3 DENSITY

2.3.1 GRANULOMETRY

2.4 VAPOUR PRESSURE

Value	:	= .000000000053 hPa at 25 °C
Decomposition	:	no
Method	:	other (calculated)

Year	:	
GLP	:	
Test substance	:	other TS: 1,2,4-Benzenetricarboxcylic acid, triisooctyl ester (CAS No. 27251-75-8)
Method	:	Vapor pressure calculation by MPBPWIN ver. 1.41 using calculation method of Grain.
Remark	:	EPI SuiteTM is used and advocated by the US EPA for chemical property estimation.
Test substance	:	CAS #27251-75-8; 1,2,4-Benzenetricarboxcylic acid, triisooctyl ester
Reliability	:	(2) valid with restrictions This robust summary is assigned a reliability of 2 because there is limited informtion on how the data were developed.
Flag	:	Critical study for SIDS endpoint

21.02.2006 (1)

2.5 PARTITION COEFFICIENT

Partition coefficient	:	
Log pow	:	= 11.59 at 25 °C
pH value	:	
Method	:	other (calculated)
Year	:	
GLP	:	
Test substance	:	other TS: 1,2,4-Benzenetricarboxcylic acid, triisooctyl ester (CAS No. 27251-75-8)
Method	:	Partition coefficient by KOWWIN ver. 1.67 using an atom/fragment calculation method of Meylan and Howard.
Remark	:	EPI SuiteTM is used and advocated by the US EPA for chemical property estimation.
Test substance	:	CAS #27251-75-8; 1,2,4-Benzenetricarboxcylic acid, triisooctyl ester
Reliability	:	(2) valid with restrictions This robust summary is assigned a reliability of 2 because there is limited informtion on how the data were developed.
Flag	:	Critical study for SIDS endpoint

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2.6.1 SOLUBILITY IN DIFFERENT MEDIA

Solubility in	:	
Value	:	.00005 other: ug/L at 25 °C
pH value	:	
concentration	:	at °C
Temperature effects	:	
Examine different pol.	:	
pKa	:	at 25 °C
Description	:	
Stable	:	
Deg. product	:	
Method	:	other: calculated
Year	:	
GLP	:	
Test substance	:	other TS:
Method	:	Water solubility calculated using WSKOW ver. 1.41 based on Kow correlation method of Meylan and Howard.
Remark	:	EPI SuiteTM is used and advocated by the US EPA for chemical property

estimation.

Test substance	:	CAS #27251-75-8; 1,2,4-Benzenetricarboxcylic acid, triisooctyl ester
Reliability	:	(2) valid with restrictions This robust summary is assigned a reliability of 2 because there is limited informtion on how the data were developed.
Flag	:	Critical study for SIDS endpoint

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2.6.2 SURFACE TENSION

2.7 FLASH POINT

2.8 AUTO FLAMMABILITY

2.9 FLAMMABILITY

2.10 EXPLOSIVE PROPERTIES

2.11 OXIDIZING PROPERTIES

2.12 DISSOCIATION CONSTANT

2.13 VISCOSITY

2.14 ADDITIONAL REMARKS

3.1.1 PHOTODEGRADATION

Type	:	air
Light source	:	Sun light
Light spectrum	:	nm
Relative intensity	:	1 based on intensity of sunlight
Conc. of substance	:	at 25 °C
DIRECT PHOTOLYSIS		
Halflife t1/2	:	
Degradation	:	50 % after 4.2 hour(s)
Quantum yield	:	
INDIRECT PHOTOLYSIS		
Sensitizer	:	OH
Conc. of sensitizer	:	1500000 molecule/cm³
Rate constant	:	.00000000003068 cm³/(molecule*sec)
Degradation	:	% after
Deg. product	:	not measured
Method	:	other (calculated)
Year	:	
GLP	:	
Test substance	:	other TS: 1,2,4-Benzenetricarboxcylic acid, triisooctyl ester (CAS No. 27251-75-8)
Method	:	Photodegradation rate calculated by AOPWIN ver. 1.91 based on the methods of Atkinson.
Remark	:	50% degradation after 4.2 hrs or 0.349 days based on a 12-hour day. The computer program AOPWIN (atmospheric oxidation program for Microsoft Windows) (EPI SuiteTM, 2000) calculates a chemical half-life for a 12-hour day (the 12-hour day half-life value normalizes degradation to a standard day light period during which hydroxyl radicals needed for degradation are generated), based on an OH- reaction rate constant and a defined OH- concentration. EPI SuiteTM is used and advocated by the US EPA for chemical property estimation.
Test substance	:	CAS #27251-75-8; 1,2,4-Benzenetricarboxcylic acid, triisooctyl ester
Reliability	:	(2) valid with restrictions This robust summary is assigned a reliability of 2 because there is limited informtion on how the data were developed.
Flag	:	Critical study for SIDS endpoint

21.02.2006 (1)

3.1.2 STABILITY IN WATER

Type	:	abiotic
t1/2 pH4	:	at °C
t1/2 pH7	:	.4 year at 25 °C
t1/2 pH9	:	at °C
Deg. product	:	not measured
Method	:	other (calculated)
Year	:	
GLP	:	
Test substance	:	other TS: 1,2,4-Benzenetricarboxcylic acid, triisooctyl ester (CAS No. 27251-75-8)
Method	:	Hydrolysis rate calculated by HYDROWIN ver. 1.67 based on work for EPA by T. Mill et al.

Remark	:	EPI SuiteTM is used and advocated by the US EPA for chemical property estimation.
Test substance	:	CAS #27251-75-8; 1,2,4-Benzenetricarboxcylic acid, triisooctyl ester
Reliability	:	(2) valid with restrictions This robust summary is assigned a reliability of 2 because there is limited informtion on how the data were developed.
Flag	:	Critical study for SIDS endpoint

21.02.2006 (1)

3.1.3 STABILITY IN SOIL

3.2.1 MONITORING DATA

3.2.2 FIELD STUDIES

3.3.1 TRANSPORT BETWEEN ENVIRONMENTAL COMPARTMENTS

Type	:	
Media	:	other: air - biota - sediment(s) - soil - water
Air	:	% (Fugacity Model Level I)
Water	:	% (Fugacity Model Level I)
Soil	:	% (Fugacity Model Level I)
Biota	:	% (Fugacity Model Level II/III)
Soil	:	% (Fugacity Model Level II/III)
Method	:	other: Calculation according Mackay, Level I
Year	:	
Remark	:	Physicochemical data used in the calculation:

Parameter Value w/ Units

Molecular Weight 546.79
Temperature 25° C
Log Kow 11.59
Water Solubility 0.000000045 g/m3
Vapor Pressure 0.0000000053 Pa
Melting Point -46°C (read across from 1,2,4-benzenetricarboxylic acid, tris(2-ethylhexyl) ester)

Result	:	Using the Mackay Level I calculation, the following distribution is predicted for 1,2,4-benzenetricarboxcylic acid, triisooctyl ester:

% Distribution	Compartment
0.0	Air
0.0	Water
97.7	Soil
2.2	Sediment
0.1	Suspended Sediment
0.0	Biota

Test substance	:	CAS #27251-75-8; 1,2,4-Benzenetricarboxcylic acid, triisooctyl ester
Reliability	:	(2) valid with restrictions This robust summary has a reliability rating of 2 because the data are calculated.
Flag	:	Critical study for SIDS endpoint

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Type	:	
Media	:	other: air - biota - sediment(s) - soil - water
Air	:	% (Fugacity Model Level I)
Water	:	% (Fugacity Model Level I)
Soil	:	% (Fugacity Model Level I)
Biota	:	% (Fugacity Model Level II/III)
Soil	:	% (Fugacity Model Level II/III)
Method	:	other: Calculation according Mackay, Level III
Year	:	

Remark :

Physicochemical data used in the calculation:

Parameter	Value w/ Units
Molecular Weight	546.79
Temperature	25° C
Log Kow	11.59
Water Solubility	0.000000045 g/m3
Vapor Pressure	0.0000000053 Pa
Melting Point	-46°C (read across from 1,2,4-benzenetricarboxylic acid, tris(2-ethylhexyl) ester)

Emissions rates used in the calculation:

Compartment	Rate (kg/hr)
Air	1000
Water	1000
Soil	1000

Half-lives used in the calculation:

Compartment	Half-life (hr)
Air	4.2a
Water	negligible
Soil	negligible
Sediment	negligible

a - as calculated using AOPWIN version 1.91, a subroutine of the computer program EPI SuiteTM version 3.12 [EPI SuiteTM (2000). Estimation Program Interface for Windows, version 3.12. Syracuse Research Corporation, Syracuse, NY, USA.]

Result : Using the Mackay Level III calculation, the following distribution is predicted for 1,2,4-benzenetricarboxcylic acid, triisooctyl ester:

Compartment	% Distribution
Air	0.0
Water	0.0
Soil	99.3
Sediment	0.7

Test substance	:	CAS #27251-75-8; 1,2,4-Benzenetricarboxcylic acid, triisooctyl ester
Reliability	:	(2) valid with restrictions This robust summary has a reliability rating of 2 because the data are calculated.
Flag	:	Critical study for SIDS endpoint

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3.3.2 DISTRIBUTION

3.4 MODE OF DEGRADATION IN ACTUAL USE

3.5 BIODEGRADATION

Type	:	
Inoculum	:	activated sludge, domestic
Contact time	:	39 day(s)
Degradation	:	- (±) % after
Result	:	
Deg. product	:	
Method	:	OECD Guide-line 301 F "Ready Biodegradability: Manometric Respirometry Test"
Year	:	1992
GLP	:	yes
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, triisooctyl ester (CAS No. 27251-75-8)

Result :

Biodegradation was based on oxygen consumption and the theoretical oxygen demand of the test substance as calculated using results of an elemental analysis of the test substance.

By day 4, >60% biodegradation of positive control was observed, which meets the guideline requirement. No deviations from the protocol occurred that affected the integrity of the study data.

The test substance biodegraded to 5.36% after 28 days and cannot be considered readily biodegradable.

Sample	% Degradation* (day 28)	Mean % Degradation (day 28)
Test Substance	5.34, 5.37**	5.36
Na Benzoate	83.6, 91.5, 83.9	86.3

Sample	% Degradation* (day 39)	Mean % Degradation (day 39)
Test Substance	5.34, 5.37**	5.36
Na Benzoate	83.6, 91.5, 83.9	86.3

* replicate data
** A replicate was excluded due to excessive oxygen consumption, indicating a breach or electrical malfunction.

Test condition : Duplicate test systems were used to evaluate the biodegradability of the test and positive control substances at mean concentrations of 52.0 mg/L and 51.4 mg/L, respectively. Blank test systems, which did not contain the test or positive control substance, were run concurrently in triplicate.

The total suspended solids (TSS) of the activated sludge was determined to be 3.93 g/L. The inoculum was added at a 1% loading volume of sludge supernatant to test medium. The microbial count of the inoculum was 106 CFU/mL. One liter of test medium, which was aerated for 24 hours with carbon dioxide free air, was added to each one liter respirometer flask. The test substance was administered by direct addition on glass fiber filters into the test medium. The test system was sealed immediately after addition of the test substance. An aliquot of the positive control stock solution was added to the appropriate test flasks.

An unacclimated activated sludge inoculum was used in this study. The inoculum was obtained from the Clinton Sanitary Wastewater Treatment Plant, Annandale, NJ, USA. The treatment plant receives domestic sewage.

All test systems were placed on a Coordinated Environmental Services (CES) automated respirometer which automatically recorded the oxygen uptake in general agreement with the OECD guideline. The 39-day study was conducted at a temperature range of 22 ± 1°C °C.

Test substance : CAS Number: 27251-75-8; 1,2,4-Benzenetricarboxylic acid, triisooctyl ester
Conclusion : Not readily biodegradable.
Reliability : (1) valid without restriction
This study has a reliability code of 1 because it followed a standard guideline and used GLP.

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3.6 BOD5, COD OR BOD5/COD RATIO

3.7 BIOACCUMULATION

3.8 ADDITIONAL REMARKS

4.1 ACUTE/PROLONGED TOXICITY TO FISH

4.2 ACUTE TOXICITY TO AQUATIC INVERTEBRATES

4.3 TOXICITY TO AQUATIC PLANTS E.G. ALGAE

4.4 TOXICITY TO MICROORGANISMS E.G. BACTERIA

4.5.1 CHRONIC TOXICITY TO FISH

4.5.2 CHRONIC TOXICITY TO AQUATIC INVERTEBRATES

4.6.1 TOXICITY TO SEDIMENT DWELLING ORGANISMS

4.6.2 TOXICITY TO TERRESTRIAL PLANTS

4.6.3 TOXICITY TO SOIL DWELLING ORGANISMS

4.6.4 TOX. TO OTHER NON MAMM. TERR. SPECIES

4.7 BIOLOGICAL EFFECTS MONITORING

4.8 BIOTRANSFORMATION AND KINETICS

4.9 ADDITIONAL REMARKS

5.0 TOXICOKINETICS, METABOLISM AND DISTRIBUTION

5.1.1 ACUTE ORAL TOXICITY

5.1.2 ACUTE INHALATION TOXICITY

5.1.3 ACUTE DERMAL TOXICITY

5.1.4 ACUTE TOXICITY, OTHER ROUTES

5.2.1 SKIN IRRITATION

5.2.2 EYE IRRITATION

5.3 SENSITIZATION

5.4 REPEATED DOSE TOXICITY

5.5 GENETIC TOXICITY ‘IN VITRO‘

5.6 GENETIC TOXICITY ‘IN VIVO‘

5.7 CARCINOGENICITY

5.8.1 TOXICITY TO FERTILITY

5.8.2 DEVELOPMENTAL TOXICITY/TERATOGENICITY

5.8.3 TOXICITY TO REPRODUCTION, OTHER STUDIES

5.9 SPECIFIC INVESTIGATIONS

5.10 EXPOSURE EXPERIENCE

5.11 ADDITIONAL REMARKS

6.1 ANALYTICAL METHODS

6.2 DETECTION AND IDENTIFICATION

7.1 FUNCTION

7.2 EFFECTS ON ORGANISMS TO BE CONTROLLED

7.3 ORGANISMS TO BE PROTECTED

7.4 USER

7.5 RESISTANCE

8.1 METHODS HANDLING AND STORING

8.2 FIRE GUIDANCE

8.3 EMERGENCY MEASURES

8.4 POSSIB. OF RENDERING SUBST. HARMLESS

8.5 WASTE MANAGEMENT

8.6 SIDE-EFFECTS DETECTION

8.7 SUBSTANCE REGISTERED AS DANGEROUS FOR GROUND WATER

8.8 REACTIVITY TOWARDS CONTAINER MATERIAL

9. References

(1) EPI SuiteTM (2000). Estimation Program Interface Suite, v3.12. Syracuse Research Corporation, Syracuse, NY, USA.

(2) ExxonMobil Biomedical Sciences, Inc. (2005). Ready Biodegradability: OECD 301F Manometric Respirometry Test. Study No. 0533179.

(3) Mackay D (1998). Level III Fugacity-Based Environmental Equilibrium Partitioning Model, Version 2.1 (16-bit). Environmental Modelling Centre, Trent University, Ontario, Canada.

(4) Wilson, A., (1996). Plasticizers - Selection, Applications and Implications. Rapra Review Reports 8:15-16.

10.1 END POINT SUMMARY

10.2 HAZARD SUMMARY

Remark : Because of the similarity in chemical structure, the Panel believes that the toxicological properties of the substances in this category will be similar as well. Thus, the Panel considers that the data for the best tested member of this category, tris-2-(ethylhexyl) trimellitate (TOTM), also represents the potential for human and environmental effects of the other members of this category.

TOTM has been sponsored under the OECD SIDS program through ICCA. A review of the available data for TOTM (see attached Table) indicates that all endpoints have been adequately addressed, and that TOTM exhibits a low order of toxicity.

Due to their higher molecular weight and bulky side chains, the remaining members of this category are expected to demonstrate a lower order of toxicity than TOTM. This is supported by a similar structural-activity relationship observed with phthalate ester compounds, i.e., the higher molecular weight phthalates (ester side chains >C7) are less active that the transitional phthalates (ester side chains C4-C6). Thus, the use of TOTM to represent the potential hazards of the other category members is a conservative position.
Chapters 4 & 5

Attached document : Summary of SIDS Information on Trimellitates.doc
Flag : confidential, Critical study for SIDS endpoint
21.02.2006

Attached document : 2xasset.Log
21.02.2006

10.3 RISK ASSESSMENT

201-16619D

RECEIVED

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I U C L I D

Data Set

Existing Chemical	:	ID: 53894-23-8
Memo	:	HPV chemical
CAS No.	:	53894-23-8
EINECS Name	:	triisononyl benzene-1,2,4-tricarboxylate
EC No.	:	258-847-9
TSCA Name	:	1,2,4-Benzenetricarboxylic acid, triisononyl ester
Molecular Formula	:	C36H60O6

Producer related part

Company	:	ExxonMobil Biomedical Sciences Inc.
Creation date	:	02.11.2000

Substance related part

Company	:	ExxonMobil Biomedical Sciences Inc.
Creation date	:	02.11.2000
Status	:	
Memo	:	ACC Phthalate Esters Panel HPV Testing Group
Printing date	:	23.02.2006
Revision date	:	
Date of last update	:	23.02.2006
Number of pages	:	21
Chapter (profile)	:	Chapter: 1, 2, 3, 4, 5, 6, 7, 8, 10
Reliability (profile)	:	Reliability: without reliability, 1, 2, 3, 4
Flags (profile)	:	Flags: without flag, confidential, non confidential, WGK (DE), TA-Luft (DE), Material Safety Dataset, Risk Assessment, Directive 67/548/EEC, SIDS

1.0.1 APPLICANT AND COMPANY INFORMATION

Type	:	lead organisation
Name	:	ACC Phthalate Esters Panel HPV Testing Group
Contact person	:	Dr. Marian Stanley
Date	:	
Street	:	1300 Wilson Blvd.
Town	:	22209 Arlington, VA
Country	:	United States
Phone	:	(703) 741-5623
Telefax	:	(703) 741-6091
Telex	:	
Cedex	:	
Email	:	
Homepage	:	

Remark : The American Chemistry Council Phthalate Esters Panel sponsoring this test plan includes the following member companies:

Eastman Chemical Company
ExxonMobil Chemical Company
Sunoco Chemicals
Teknor Apex Company

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1.0.2 LOCATION OF PRODUCTION SITE, IMPORTER OR FORMULATOR

1.0.3 IDENTITY OF RECIPIENTS

1.0.4 DETAILS ON CATEGORY/TEMPLATE

Comment : This chemical is part of the Trimellitate category. The category includes the following four CAS numbers: 3319-31-1, 27251-75-8, 53894-23-8 and 67989-23-5.

Remark : DESCRIPTION OF THE TRIMELLITATES CATEGORY

The trimellitates comprise a family of chemicals synthesized by esterifying trimellitic anhydride with alcohols with average carbon numbers ranging from approximately C7-C10, in the presence of an acid catalyst. The category includes the four trimellitates: 3319-31-1 (TOTM), 27251-75-8 (TIOTM),
53894-23-8 (TINTM), and 67989-23-5 (DOTM). Trimellitates in this category are all 1,2,4-benzenetricarboxylic acids with side chain ester groups ranging from C8 to C10. The structural formula for trimellitates varies somewhat depending on the isomeric composition of the alcohols used in their manufacture. The specific alcohols used are 2-ethylhexanol (TOTM), iso-octyl alcohol (TIOTM), iso-nonyl alcohol (TINTM), and a mixture of linear and branched decyl (40%) and octyl (60%) alcohols (DOTM).

Trimellitates are colorless to slightly yellow liquids with high boiling points (> 250oC) and low vapor pressures; properties which contribute to their

high physical stability. They are readily soluble in most organic solvents and miscible with alcohol, ether and most oils, but essentially insoluble in water. Because of the similarity in structure as well as physicochemical properties, the trimellitates were grouped into a single category containing four substances with carboxylic side chain ester groups ranging from C8-C10.

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1.1.0 SUBSTANCE IDENTIFICATION

1.1.1 GENERAL SUBSTANCE INFORMATION

Purity type	:	
Substance type	:	organic
Physical status	:	liquid
Purity	:	
Colour	:	
Odour	:	

Remark : The products described within this document are the result of a reaction between alcohols and trimellitic anhydride. This reaction is carried to completion and typically 99% or greater of the starting substances are converted to product. Consequently, the only other substances in the final product include very small amounts of free alcohol and trimellitic acid. All testing has been performed on the commercial grade substances without any additive, unless specifically indicated.

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1.1.2 SPECTRA

1.2 SYNONYMS AND TRADENAMES

1.3 IMPURITIES

1.4 ADDITIVES

1.5 TOTAL QUANTITY

1.6.1 LABELLING

1.6.2 CLASSIFICATION

1.6.3 PACKAGING

1.7 USE PATTERN

Type of use : industrial
Category : Polymers industry

Remark : Trimellitates are used predominantly as plasticizers for production of flexible PVC. Because of their relatively high molecular weight (>500 g/mole) and bulky structure, they have lower volatility and greater resistance to migration than the corresponding phthalate ester plasticizers. They are predominantly used in the manufacture of high temperature PVC cables (Wilson, 1996). Since these chemicals are produced in closed systems, there is essentially no occupational exposure to these substances except at the flexible PVC production facility. Usually, these substances have been already blended to the compound as plasticizer, so it is not expected that downstream users or consumers are directly exposed to trimellitates.

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1.7.1 DETAILED USE PATTERN

1.7.2 METHODS OF MANUFACTURE

1.8 REGULATORY MEASURES

1.8.1 OCCUPATIONAL EXPOSURE LIMIT VALUES

1.8.2 ACCEPTABLE RESIDUES LEVELS

1.8.3 WATER POLLUTION

1.8.4 MAJOR ACCIDENT HAZARDS

1.8.5 AIR POLLUTION

1.8.6 LISTINGS E.G. CHEMICAL INVENTORIES

1.9.1 DEGRADATION/TRANSFORMATION PRODUCTS

1.9.2 COMPONENTS

1.10 SOURCE OF EXPOSURE

1.11 ADDITIONAL REMARKS

1.12 LAST LITERATURE SEARCH

1.13 REVIEWS

2.1 MELTING POINT

Value	:	224 °C
Sublimation	:	no
Method	:	other: (calculated)
Year	:	
GLP	:	
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, triisononyl ester (CAS No. 53894-23-8)
Method	:	Melting point calculation by MPBPWIN ver. 1.41 using calculation methods of Joback and Gold and Ogle.
Remark	:	EPI SuiteTM is used and advocated by the US EPA for chemical property estimation. Melting point calculation seems to give erroneously high results for this class of chemicals.
Test substance	:	CAS #53894-23-8; 1,2,4-Benzenetricarboxylic acid, triisononyl ester
Reliability	:	(3) invalid

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2.2 BOILING POINT

Value	:	575 °C at 1013 hPa
Decomposition	:	no
Method	:	other: (calculated)
Year	:	
GLP	:	
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, triisononyl ester (CAS No. 53894-23-8)
Method	:	Boiling point calculation by MPBPWIN ver. 1.41 using calculation method of Stein and Brown.
Remark	:	EPI SuiteTM is used and advocated by the US EPA for chemical property estimation.
Test substance	:	CAS #53894-23-8; 1,2,4-Benzenetricarboxylic acid, triisononyl ester
Reliability	:	(2) valid with restrictions This robust summary is assigned a reliability of 2 because there is limited informtion on how the data were developed.
Flag	:	Critical study for SIDS endpoint

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2.3 DENSITY

2.3.1 GRANULOMETRY

2.4 VAPOUR PRESSURE

Value	:	= .0000000000032 hPa at 25 °C
Decomposition	:	no
Method	:	other (calculated)
Year	:	
GLP	:	

Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, triisononyl ester (CAS No. 53894-23-8)
Method	:	Vapor pressure calculation by MPBPWIN ver. 1.41 using calculation method of Grain.
Remark	:	EPI SuiteTM is used and advocated by the US EPA for chemical property estimation.
Test substance	:	CAS #53894-23-8; 1,2,4-Benzenetricarboxylic acid, triisononyl ester
Reliability	:	(2) valid with restrictions This robust summary is assigned a reliability of 2 because there is limited informtion on how the data were developed.
Flag	:	Critical study for SIDS endpoint

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2.5 PARTITION COEFFICIENT

Partition coefficient	:	
Log pow	:	13.06 at 25 °C
pH value	:	
Method	:	other (calculated)
Year	:	
GLP	:	
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, triisononyl ester (CAS No. 53894-23-8)
Method	:	Partition coefficient by KOWWIN ver. 1.67 using an atom/fragment calculation method of Meylan and Howard.
Remark	:	EPI SuiteTM is used and advocated by the US EPA for chemical property estimation.
Test substance	:	CAS #53894-23-8; 1,2,4-Benzenetricarboxylic acid, triisononyl ester
Reliability	:	(2) valid with restrictions This robust summary is assigned a reliability of 2 because there is limited informtion on how the data were developed.
Flag	:	Critical study for SIDS endpoint

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2.6.1 SOLUBILITY IN DIFFERENT MEDIA

Solubility in	:	
Value	:	.0013 other: ng/l at 25 °C
pH value	:	
concentration	:	at °C
Temperature effects	:	
Examine different pol.	:	
pKa	:	at 25 °C
Description	:	
Stable	:	
Deg. product	:	
Method	:	other: calculated
Year	:	
GLP	:	
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, triisononyl ester (CAS No. 53894-23-8)
Method	:	Water solubility calculated using WSKOW ver. 1.41 based on Kow correlation method of Meylan and Howard.
Remark	:	EPI SuiteTM is used and advocated by the US EPA for chemical property estimation.

Test substance	:	CAS #53894-23-8; 1,2,4-Benzenetricarboxylic acid, triisononyl ester
Reliability	:	(2) valid with restrictions This robust summary is assigned a reliability of 2 because there is limited informtion on how the data were developed.
Flag	:	Critical study for SIDS endpoint

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2.6.2 SURFACE TENSION

2.7 FLASH POINT

2.8 AUTO FLAMMABILITY

2.9 FLAMMABILITY

2.10 EXPLOSIVE PROPERTIES

2.11 OXIDIZING PROPERTIES

2.12 DISSOCIATION CONSTANT

2.13 VISCOSITY

2.14 ADDITIONAL REMARKS

3.1.1 PHOTODEGRADATION

Type	:	air
Light source	:	Sun light
Light spectrum	:	nm
Relative intensity	:	1 based on intensity of sunlight
Conc. of substance	:	at 25 °C
INDIRECT PHOTOLYSIS		
Sensitizer	:	OH
Conc. of sensitizer	:	1500000 molecule/cm³
Rate constant	:	.0000000000349 cm³/(molecule*sec)
Degradation	:	50 % after 3.7 hour(s)
Deg. product	:	
Method	:	
Year	:	
GLP	:	
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, triisononyl ester (CAS No. 53894-23-8)
Method	:	Photodegradation rate calculated by AOPWIN ver. 1.91 based on the methods of Atkinson.
Remark	:	50% degradation after 3.7 hrs or 0.306 days based on a 12-hour day. The computer program AOPWIN (atmospheric oxidation program for Microsoft Windows) (EPI SuiteTM, 2000) calculates a chemical half-life for a 12-hour day (the 12-hour day half-life value normalizes degradation to a standard day light period during which hydroxyl radicals needed for degradation are generated), based on an OH- reaction rate constant and a defined OH- concentration. EPI SuiteTM is used and advocated by the US EPA for chemical property estimation.
Test substance	:	CAS #53894-23-8; 1,2,4-Benzenetricarboxylic acid, triisononyl ester
Reliability	:	(2) valid with restrictions This robust summary is assigned a reliability of 2 because there is limited informtion on how the data were developed.
Flag	:	Critical study for SIDS endpoint

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3.1.2 STABILITY IN WATER

Type	:	abiotic
t1/2 pH4	:	at °C
t1/2 pH7	:	.9 year at 25 °C
t1/2 pH9	:	at °C
Deg. product	:	not measured
Method	:	other (calculated)
Year	:	
GLP	:	
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, triisononyl ester (CAS No. 53894-23-8)
Method	:	Hydrolysis rate calculated by HYDROWIN ver. 1.67 based on work for EPA by T. Mill et al.
Remark	:	EPI SuiteTM is used and advocated by the US EPA for chemical property estimation.
Test substance	:	CAS #53894-23-8; 1,2,4-Benzenetricarboxylic acid, triisononyl ester
Reliability	:	(2) valid with restrictions

This robust summary is assigned a reliability of 2 because there is limited informtion on how the data were developed.

Flag : Critical study for SIDS endpoint
21.02.2006 (1)

3.1.3 STABILITY IN SOIL

3.2.1 MONITORING DATA

3.2.2 FIELD STUDIES

3.3.1 TRANSPORT BETWEEN ENVIRONMENTAL COMPARTMENTS

Type :
Media : other: air - biota - sediment(s) - soil - water
Air : % (Fugacity Model Level I)
Water : % (Fugacity Model Level I)
Soil : % (Fugacity Model Level I)
Biota : % (Fugacity Model Level II/III)
Soil : % (Fugacity Model Level II/III)
Method : other: Calculation according Mackay, Level I
Year :

Remark : Physicochemical data used in the calculation:

Parameter	Value w/ Units
Molecular Weight	588.88
Temperature	25° C
Log Kow	13.06
Water Solubility	0.0000000013 g/m3
Vapor Pressure	0.00000000032 Pa
Melting Point	-46°C (read across from 1,2,4-benzenetricarboxylic acid, tris(2-ethylhexyl) ester)

Result : Using the Mackay Level I calculation, the following distribution is predicted for 1,2,4-benzenetricarboxylic acid, triisononyl ester:

% Distribution	Compartment
0.0	Air
0.0	Water
97.7	Soil
2.2	Sediment
0.1	Suspended Sediment
0.0	Biota

Test substance : CAS #53894-23-8; 1,2,4-Benzenetricarboxylic acid, triisononyl ester
Reliability : (2) valid with restrictions
This robust summary has a reliability rating of 2 because the data are calculated.
Flag : Critical study for SIDS endpoint
21.02.2006 (4)

Type :
Media : other: air - biota - sediment(s) - soil - water
Air : % (Fugacity Model Level I)

Water : % (Fugacity Model Level I)
Soil : % (Fugacity Model Level I)
Biota : % (Fugacity Model Level II/III)
Soil : % (Fugacity Model Level II/III)
Method : other: Calculation according Mackay, Level III
Year :

Remark : Physicochemical data used in the calculation:

Parameter Value w/ Units

Molecular Weight 588.88
Temperature 25° C
Log Kow 13.06
Water Solubility 0.0000000013 g/m3
Vapor Pressure 0.00000000032 Pa
Melting Point -46°C (read across from 1,2,4-benzenetricarboxylic acid, tris(2-ethylhexyl) ester)

Emissions rates used in the calculation:

Compartment Rate (kg/hr)

Air 1000
Water 1000
Soil 1000

Half-lives used in the calculation:

Compartment Half-life (hr)

Air 3.7a
Water negligible
Soil negligible
Sediment negligible

a - as calculated using AOPWIN version 1.91, a subroutine of the computer program EPI SuiteTM version 3.12 [EPI SuiteTM (2000). Estimation Program Interface for Windows, version 3.12. Syracuse Research Corporation, Syracuse, NY, USA.]

Result : Using the Mackay Level III calculation, the following distribution is predicted for 1,2,4-benzenetricarboxylic acid, triisononyl ester:

Compartment % Distribution
Air 0.0
Water 0.0
Soil 99.3
Sediment 0.7

Test substance : CAS #53894-23-8; 1,2,4-Benzenetricarboxylic acid, triisononyl ester
Reliability : (2) valid with restrictions
This robust summary has a reliability rating of 2 because the data are calculated.
Flag : Critical study for SIDS endpoint
21.02.2006 (4)

3.3.2 DISTRIBUTION

3.4 MODE OF DEGRADATION IN ACTUAL USE

3.5 BIODEGRADATION

Type	:	
Inoculum	:	activated sludge, domestic
Contact time	:	39 day(s)
Degradation	:	(±) % after
Result	:	
Deg. product	:	
Method	:	OECD Guide-line 301 F "Ready Biodegradability: Manometric Respirometry Test"
Year	:	1992
GLP	:	yes
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, triisononyl ester (CAS No. 53894-23-8)

Result :

Biodegradation was based on oxygen consumption and the theoretical oxygen demand of the test substance as calculated using results of an elemental analysis of the test substance.

By day 4, >60% biodegradation of positive control was observed, which meets the guideline requirement. No deviations from the protocol occurred that affected the integrity of the study data.

The test substance biodegraded to 4.19% after 28 days and cannot be considered readily biodegradable.

Sample	% Degradation* (day 28)	Mean % Degradation (day 28)
Test Substance	2.02, 5.04, 5.52	4.19
Na Benzoate	83.6, 91.5, 83.9	86.3

Sample	% Degradation* (day 39)	Mean % Degradation (day 39)
Test Substance	3.02, 5.04, 5.52	4.53
Na Benzoate	83.6, 91.5, 83.9	86.3

* replicate data

Test condition :

Triplicate test systems were used to evaluate the biodegradability of the test and positive control substances at mean concentrations of 50.0 mg/L and 51.4 mg/L, respectively. Blank test systems, which did not contain the test or positive control substance, were run concurrently in triplicate.

The total suspended solids (TSS) of the activated sludge was determined to be 3.93 g/L. The inoculum was added at a 1% loading volume of sludge supernatant to test medium. The microbial count of the inoculum was 106 CFU/mL. One liter of test medium, which was aerated for 24 hours with carbon dioxide free air, was added to each one liter respirometer flask. The test substance was administered by direct addition on glass fiber filters into the test medium. The test system was sealed immediately after addition of the test substance. An aliquot of the positive control stock solution was added to the appropriate test flasks.

An unacclimated activated sludge inoculum was used in this study. The inoculum was obtained from the Clinton Sanitary Wastewater Treatment Plant, Annandale, NJ, USA. The treatment plant receives domestic sewage.

		All test systems were placed on a Coordinated Environmental Services (CES) automated respirometer which automatically recorded the oxygen uptake in general agreement with the OECD guideline. The 39-day study was conducted at a temperature range of 22 ± 1°C °C.
Test substance	:	CAS Number: 53894-23-8; 1,2,4-Benzenetricarboxylic acid, triisononyl ester
Conclusion	:	Not readily biodegradable.
Reliability	:	(1) valid without restriction This study has a reliability code of 1 because it followed a standard guideline and used GLP.

23.02.2006 (3)

3.6 BOD5, COD OR BOD5/COD RATIO

3.7 BIOACCUMULATION

3.8 ADDITIONAL REMARKS

4.1 ACUTE/PROLONGED TOXICITY TO FISH

4.2 ACUTE TOXICITY TO AQUATIC INVERTEBRATES

4.3 TOXICITY TO AQUATIC PLANTS E.G. ALGAE

4.4 TOXICITY TO MICROORGANISMS E.G. BACTERIA

4.5.1 CHRONIC TOXICITY TO FISH

4.5.2 CHRONIC TOXICITY TO AQUATIC INVERTEBRATES

4.6.1 TOXICITY TO SEDIMENT DWELLING ORGANISMS

4.6.2 TOXICITY TO TERRESTRIAL PLANTS

4.6.3 TOXICITY TO SOIL DWELLING ORGANISMS

4.6.4 TOX. TO OTHER NON MAMM. TERR. SPECIES

4.7 BIOLOGICAL EFFECTS MONITORING

4.8 BIOTRANSFORMATION AND KINETICS

4.9 ADDITIONAL REMARKS

5.0 TOXICOKINETICS, METABOLISM AND DISTRIBUTION

5.1.1 ACUTE ORAL TOXICITY

Type	:	LD50
Value	:	> - 10000 mg/kg bw
Species	:	rat
Strain	:	Sprague-Dawley
Sex	:	male
Number of animals	:	20
Vehicle	:	no data
Doses	:	
Method	:	other
Year	:	1969
GLP	:	no
Test substance	:	other TS
Remark	:	No rats died during the study. At the two higher dose levels, decreased activity was observed one hour after dosing. Excessive urination and/or diarrhea were initially observed but decreased by 48 hours (5000 mg/kg level) or by Day 5 (10,000 mg/kg level).
Test condition	:	Immediately following a 3-4 hour fasting period, animals were administered the test compound at doses of 417, 1450, 5000 and 10000 mg/kg of body weight. Observations were recorded immediately after dosing, then at 1, 4 and 24 hours; and once daily thereafter for 14 days. Gross necropsies were conducted on all animals that were sacrificed at the termination of the study.
Test substance	:	1,2,4-benzenetricarboxylic acid, triisononyl ester (triisononyl phthalate)
Conclusion	:	Under the conditions of this study, the test material has a low order of acute oral toxicity.
Reliability	:	(2) valid with restrictions
Flag	:	Critical study for SIDS endpoint

28.12.2000 (2)

5.1.2 ACUTE INHALATION TOXICITY

5.1.3 ACUTE DERMAL TOXICITY

5.1.4 ACUTE TOXICITY, OTHER ROUTES

5.2.1 SKIN IRRITATION

5.2.2 EYE IRRITATION

5.3 SENSITIZATION

5.4 REPEATED DOSE TOXICITY

5.5 GENETIC TOXICITY ‘IN VITRO‘

5.6 GENETIC TOXICITY ‘IN VIVO‘

5.7 CARCINOGENICITY

5.8.1 TOXICITY TO FERTILITY

5.8.2 DEVELOPMENTAL TOXICITY/TERATOGENICITY

5.8.3 TOXICITY TO REPRODUCTION, OTHER STUDIES

5.9 SPECIFIC INVESTIGATIONS

5.10 EXPOSURE EXPERIENCE

5.11 ADDITIONAL REMARKS

6.1 ANALYTICAL METHODS

6.2 DETECTION AND IDENTIFICATION

7.1 FUNCTION

7.2 EFFECTS ON ORGANISMS TO BE CONTROLLED

7.3 ORGANISMS TO BE PROTECTED

7.4 USER

7.5 RESISTANCE

8.1 METHODS HANDLING AND STORING

8.2 FIRE GUIDANCE

8.3 EMERGENCY MEASURES

8.4 POSSIB. OF RENDERING SUBST. HARMLESS

8.5 WASTE MANAGEMENT

8.6 SIDE-EFFECTS DETECTION

8.7 SUBSTANCE REGISTERED AS DANGEROUS FOR GROUND WATER

8.8 REACTIVITY TOWARDS CONTAINER MATERIAL

(1) EPI SuiteTM (2000). Estimation Program Interface Suite, v3.12. Syracuse Research Corporation, Syracuse, NY, USA.

(2) Esso Research and Engineering Company (1969). Acute Oral Administration in Rats. Unpublished Report. Esso Research and Engineering Company (1969). Acute Oral Administration in Rats. Unpublished Report.

(3) ExxonMobil Biomedical Sciences, Inc. (2005). Ready Biodegradability: OECD 301F Manometric Respirometry Test. Study No. 0533179.

(4) Mackay D (1998). Level III Fugacity-Based Environmental Equilibrium Partitioning Model, Version 2.1 (16-bit). Environmental Modelling Centre, Trent University, Ontario, Canada.

(5) Wilson, A., (1996). Plasticizers - Selection, Applications and Implications. Rapra Review Reports 8:15-16.

10.1 END POINT SUMMARY

10.2 HAZARD SUMMARY

Remark : Because of the similarity in chemical structure, the Panel believes that the toxicological properties of the substances in this category will be similar as well. Thus, the Panel considers that the data for the best tested member of this category, tris-2-(ethylhexyl) trimellitate (TOTM), also represents the potential for human and environmental effects of the other members of this category.

TOTM has been sponsored under the OECD SIDS program through ICCA. A review of the available data for TOTM (see attached Table) indicates that all endpoints have been adequately addressed, and that TOTM exhibits a low order of toxicity.

Due to their higher molecular weight and bulky side chains, the remaining members of this category are expected to demonstrate a lower order of toxicity than TOTM. This is supported by a similar structural-activity relationship observed with phthalate ester compounds, i.e., the higher molecular weight phthalates (ester side chains >C7) are less active that the transitional phthalates (ester side chains C4-C6). Thus, the use of TOTM to represent the potential hazards of the other category members is a conservative position.
Chapters 4 & 5

Attached document : Summary of SIDS Information on Trimellitates.doc
Flag : confidential, Critical study for SIDS endpoint
21.02.2006

Attached document : 2xasset.Log
21.02.2006

10.3 RISK ASSESSMENT

201-16619E

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IUCLID

Data Set

Existing Chemical	:	ID: 67989-23-5
Memo	:	HPV chemical
CAS No.	:	67989-23-5
EINECS Name	:	1,2,4-Benzenetricarboxylic acid, decyl octyl ester
EC No.	:	268-007-3
TSCA Name	:	1,2,4-Benzenetricarboxylic acid, decyl octyl ester
Molecular Formula	:	C10H22O.xC9H6O6.xC8H18O

Producer related part

Company	:	ExxonMobil Biomedical Sciences Inc.
Creation date	:	02.11.2000

Substance related part

Company	:	ExxonMobil Biomedical Sciences Inc.
Creation date	:	02.11.2000
Status	:	
Memo	:	ACC Phthalate Esters Panel HPV Testing Group
Printing date	:	23.02.2006
Revision date	:	
Date of last update	:	23.02.2006
Number of pages	:	21
Chapter (profile)	:	Chapter: 1, 2, 3, 4, 5, 6, 7, 8, 10
Reliability (profile)	:	Reliability: without reliability, 1, 2, 3, 4
Flags (profile)	:	Flags: without flag, confidential, non confidential, WGK (DE), TA-Luft (DE), Material Safety Dataset, Risk Assessment, Directive 67/548/EEC, SIDS

1.0.1 APPLICANT AND COMPANY INFORMATION

Type	:	lead organisation
Name	:	ACC Phthalate Esters Panel HPV Testing Group
Contact person	:	Dr. Marian Stanley
Date	:	
Street	:	1300 Wilson Blvd.
Town	:	22209 Arlington, VA
Country	:	United States
Phone	:	(703) 741-5623
Telefax	:	(703) 741-6091
Telex	:	
Cedex	:	
Email	:	
Homepage	:	

Remark : The American Chemistry Council Phthalate Esters Panel sponsoring this test plan includes the following member companies:

Eastman Chemical Company
ExxonMobil Chemical Company
Sunoco Chemicals
Teknor Apex Company

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1.0.2 LOCATION OF PRODUCTION SITE, IMPORTER OR FORMULATOR

1.0.3 IDENTITY OF RECIPIENTS

1.0.4 DETAILS ON CATEGORY/TEMPLATE

Comment : This chemical is part of the Trimellitate category. The category includes the following four CAS numbers: 3319-31-1, 27251-75-8, 53894-23-8 and 67989-23-5.

Remark : DESCRIPTION OF THE TRIMELLITATES CATEGORY

The trimellitates comprise a family of chemicals synthesized by esterifying trimellitic anhydride with alcohols with average carbon numbers ranging from approximately C7-C10, in the presence of an acid catalyst. The category includes the four trimellitates: 3319-31-1 (TOTM), 27251-75-8 (TIOTM),
53894-23-8 (TINTM), and 67989-23-5 (DOTM). Trimellitates in this category are all 1,2,4-benzenetricarboxylic acids with side chain ester groups ranging from C8 to C10. The structural formula for trimellitates varies somewhat depending on the isomeric composition of the alcohols used in their manufacture. The specific alcohols used are 2-ethylhexanol (TOTM), iso-octyl alcohol (TIOTM), iso-nonyl alcohol (TINTM), and a mixture of linear and branched decyl (40%) and octyl (60%) alcohols (DOTM).

Trimellitates are colorless to slightly yellow liquids with high boiling points (> 250oC) and low vapor pressures; properties which contribute to their

high physical stability. They are readily soluble in most organic solvents and miscible with alcohol, ether and most oils, but essentially insoluble in water. Because of the similarity in structure as well as physicochemical properties, the trimellitates were grouped into a single category containing four substances with carboxylic side chain ester groups ranging from C8-C10.

21.02.2006

1.1.0 SUBSTANCE IDENTIFICATION

1.1.1 GENERAL SUBSTANCE INFORMATION

Purity type	:	
Substance type	:	organic
Physical status	:	liquid
Purity	:	
Colour	:	
Odour	:	

Remark : The products described within this document are the result of a reaction between alcohols and trimellitic anhydride. This reaction is carried to completion and typically 99% or greater of the starting substances are converted to product. Consequently, the only other substances in the final product include very small amounts of free alcohol and trimellitic acid. All testing has been performed on the commercial grade substances without any additive, unless specifically indicated.

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1.1.2 SPECTRA

1.2 SYNONYMS AND TRADENAMES

1.3 IMPURITIES

1.4 ADDITIVES

1.5 TOTAL QUANTITY

1.6.1 LABELLING

1.6.2 CLASSIFICATION

1.6.3 PACKAGING

1.7 USE PATTERN

Type of use : industrial
Category : Polymers industry

Remark : Trimellitates are used predominantly as plasticizers for production of flexible PVC. Because of their relatively high molecular weight (>500 g/mole) and bulky structure, they have lower volatility and greater resistance to migration than the corresponding phthalate ester plasticizers. They are predominantly used in the manufacture of high temperature PVC cables (Wilson, 1996). Since these chemicals are produced in closed systems, there is essentially no occupational exposure to these substances except at the flexible PVC production facility. Usually, these substances have been already blended to the compound as plasticizer, so it is not expected that downstream users or consumers are directly exposed to trimellitates.

21.02.2006 (4)

1.7.1 DETAILED USE PATTERN

1.7.2 METHODS OF MANUFACTURE

1.8 REGULATORY MEASURES

1.8.1 OCCUPATIONAL EXPOSURE LIMIT VALUES

1.8.2 ACCEPTABLE RESIDUES LEVELS

1.8.3 WATER POLLUTION

1.8.4 MAJOR ACCIDENT HAZARDS

1.8.5 AIR POLLUTION

1.8.6 LISTINGS E.G. CHEMICAL INVENTORIES

1.9.1 DEGRADATION/TRANSFORMATION PRODUCTS

1.9.2 COMPONENTS

1.10 SOURCE OF EXPOSURE

1.11 ADDITIONAL REMARKS

1.12 LAST LITERATURE SEARCH

1.13 REVIEWS

2.1 MELTING POINT

Value	:	234 °C
Decomposition	:	no, at °C
Sublimation	:	no
Method	:	other: (calculated)
Year	:	
GLP	:	
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, decyl octyl ester (CAS No. 67989-23-5)
Method	:	Melting point calculation by MPBPWIN ver. 1.41 using calculation methods of Joback and Gold and Ogle.
Remark	:	EPI SuiteTM is used and advocated by the US EPA for chemical property estimation. Melting point calculation seems to give erroneously high results for this class of chemicals.
Test substance	:	CAS #67989-23-5; 1,2,4-Benzenetricarboxylic acid, decyl octyl ester
Reliability	:	(3) invalid

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2.2 BOILING POINT

Value	:	585 °C at 1013 hPa
Decomposition	:	no
Method	:	other: (calculated)
Year	:	
GLP	:	
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, decyl octyl ester (CAS No. 67989-23-5)
Method	:	Boiling point calculation by MPBPWIN ver. 1.41 using calculation method of Stein and Brown.
Remark	:	EPI SuiteTM is used and advocated by the US EPA for chemical property estimation.
Test substance	:	CAS #67989-23-5; 1,2,4-Benzenetricarboxylic acid, decyl octyl ester
Reliability	:	(2) valid with restrictions This robust summary is assigned a reliability of 2 because there is limited informtion on how the data were developed.
Flag	:	Critical study for SIDS endpoint

21.02.2006 (1)

2.3 DENSITY

2.3.1 GRANULOMETRY

2.4 VAPOUR PRESSURE

Value	:	= .0000000000014 hPa at 25 °C
Decomposition	:	no
Method	:	other (calculated)
Year	:	

GLP	:	
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, decyl octyl ester (CAS No. 67989-23-5)
Method	:	Vapor pressure calculation by MPBPWIN ver. 1.41 using calculation method of Grain.
Remark	:	EPI SuiteTM is used and advocated by the US EPA for chemical property estimation.
Test substance	:	CAS #67989-23-5; 1,2,4-Benzenetricarboxylic acid, decyl octyl ester
Reliability	:	(2) valid with restrictions This robust summary is assigned a reliability of 2 because there is limited informtion on how the data were developed.
Flag	:	Critical study for SIDS endpoint

21.02.2006 (1)

2.5 PARTITION COEFFICIENT

Partition coefficient	:	
Log pow	:	12.79 at 25 °C
pH value	:	
Method	:	other (calculated)
Year	:	
GLP	:	
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, decyl octyl ester (CAS No. 67989-23-5)
Method	:	Partition coefficient by KOWWIN ver. 1.67 using an atom/fragment calculation method of Meylan and Howard.
Remark	:	EPI SuiteTM is used and advocated by the US EPA for chemical property estimation.
Test substance	:	CAS #67989-23-5; 1,2,4-Benzenetricarboxylic acid, decyl octyl ester
Reliability	:	(2) valid with restrictions This robust summary is assigned a reliability of 2 because there is limited informtion on how the data were developed.
Flag	:	Critical study for SIDS endpoint

21.02.2006 (1)

2.6.1 SOLUBILITY IN DIFFERENT MEDIA

Solubility in	:	
Value	:	.0028 other: ng/l at 25 °C
pH value	:	
concentration	:	at °C
Temperature effects	:	
Examine different pol.	:	
pKa	:	at 25 °C
Description	:	
Stable	:	
Deg. product	:	
Method	:	other: calculated
Year	:	
GLP	:	
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, decyl octyl ester (CAS No. 67989-23-5)
Method	:	Water solubility calculated using WSKOW ver. 1.41 based on Kow correlation method of Meylan and Howard.
Remark	:	EPI SuiteTM is used and advocated by the US EPA for chemical property

estimation.

Test substance	:	CAS #67989-23-5; 1,2,4-Benzenetricarboxylic acid, decyl octyl ester
Reliability	:	(2) valid with restrictions This robust summary is assigned a reliability of 2 because there is limited informtion on how the data were developed.
Flag	:	Critical study for SIDS endpoint

21.02.2006 (1)

2.6.2 SURFACE TENSION

2.7 FLASH POINT

2.8 AUTO FLAMMABILITY

2.9 FLAMMABILITY

2.10 EXPLOSIVE PROPERTIES

2.11 OXIDIZING PROPERTIES

2.12 DISSOCIATION CONSTANT

2.13 VISCOSITY

2.14 ADDITIONAL REMARKS

3.1.1 PHOTODEGRADATION

Type	:	air
Light source	:	Sun light
Light spectrum	:	nm
Relative intensity	:	1 based on intensity of sunlight
Conc. of substance	:	at 25 °C
INDIRECT PHOTOLYSIS		
Sensitizer	:	OH
Conc. of sensitizer	:	1500000 molecule/cm³
Rate constant	:	.0000000000335 cm³/(molecule*sec)
Degradation	:	50 % after 3.8 hour(s)
Deg. product	:	not measured
Method	:	other (calculated)
Year	:	
GLP	:	
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, decyl octyl ester (CAS No. 67989-23-5)
Method	:	Photodegradation rate calculated by AOPWIN ver. 1.91 based on the methods of Atkinson.
Remark	:	50% degradation after 3.8 hrs or 0.319 days based on a 12-hour day. The computer program AOPWIN (atmospheric oxidation program for Microsoft Windows) (EPI SuiteTM, 2000) calculates a chemical half-life for a 12-hour day (the 12-hour day half-life value normalizes degradation to a standard day light period during which hydroxyl radicals needed for degradation are generated), based on an OH- reaction rate constant and a defined OH- concentration. EPI SuiteTM is used and advocated by the US EPA for chemical property estimation.
Test substance	:	CAS #67989-23-5; 1,2,4-Benzenetricarboxylic acid, decyl octyl ester
Reliability	:	(2) valid with restrictions This robust summary is assigned a reliability of 2 because there is limited informtion on how the data were developed.
Flag	:	Critical study for SIDS endpoint

21.02.2006 (1)

3.1.2 STABILITY IN WATER

Type	:	abiotic
t1/2 pH4	:	at °C
t1/2 pH7	:	1 year at 25 °C
t1/2 pH9	:	at °C
Deg. product	:	not measured
Method	:	other (calculated)
Year	:	
GLP	:	
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, decyl octyl ester (CAS No. 67989-23-5)
Method	:	Hydrolysis rate calculated by HYDROWIN ver. 1.67 based on work for EPA by T. Mill et al.
Remark	:	EPI SuiteTM is used and advocated by the US EPA for chemical property estimation.
Test substance	:	CAS #67989-23-5; 1,2,4-Benzenetricarboxylic acid, decyl octyl ester
Reliability	:	(2) valid with restrictions

This robust summary is assigned a reliability of 2 because there is limited informtion on how the data were developed.

Flag : Critical study for SIDS endpoint
21.02.2006 (1)

3.1.3 STABILITY IN SOIL

3.2.1 MONITORING DATA

3.2.2 FIELD STUDIES

3.3.1 TRANSPORT BETWEEN ENVIRONMENTAL COMPARTMENTS

Type :
Media : other: air - biota - sediment(s) - soil - water
Air : % (Fugacity Model Level I)
Water : % (Fugacity Model Level I)
Soil : % (Fugacity Model Level I)
Biota : % (Fugacity Model Level II/III)
Soil : % (Fugacity Model Level II/III)
Method : other: Calculation according Mackay, Level I
Year :

Remark : Physicochemical data used in the calculation:

Parameter	Value w/ Units
Molecular Weight	574.85
Temperature	25° C
Log Kow	12.79
Water Solubility	0.0000000028 g/m3
Vapor Pressure	0.00000000014 Pa
Melting Point	-46°C (read across from 1,2,4-benzenetricarboxylic acid, tris(2-ethylhexyl) ester)

Result : Using the Mackay Level I calculation, the following distribution is predicted for 1,2,4-benzenetricarboxylic acid, decyl octyl ester:

% Distribution	Compartment
0.0	Air
0.0	Water
97.7	Soil
2.2	Sediment
0.1	Suspended Sediment
0.0	Biota

Test substance : CAS #67989-23-5; 1,2,4-Benzenetricarboxylic acid, decyl octyl ester
Reliability : (2) valid with restrictions
This robust summary has a reliability rating of 2 because the data are calculated.
Flag : Critical study for SIDS endpoint
21.02.2006 (3)

Type :
Media : other: air - biota - sediment(s) - soil - water
Air : % (Fugacity Model Level I)

Water : % (Fugacity Model Level I)
Soil : % (Fugacity Model Level I)
Biota : % (Fugacity Model Level II/III)
Soil : % (Fugacity Model Level II/III)
Method : other: Calculation according Mackay, Level III
Year :

Remark : Physicochemical data used in the calculation:

Parameter Value w/ Units

Molecular Weight 574.85
Temperature 25° C
Log Kow 12.79
Water Solubility 0.0000000028 g/m3
Vapor Pressure 0.00000000014 Pa
Melting Point -46°C (read across from 1,2,4-benzenetricarboxylic acid, tris(2-ethylhexyl) ester)

Emissions rates used in the calculation:

Compartment Rate (kg/hr)

Air 1000
Water 1000
Soil 1000

Half-lives used in the calculation:

Compartment Half-life (hr)

Air 3.8a
Water negligible
Soil negligible
Sediment negligible

a - as calculated using AOPWIN version 1.91, a subroutine of the computer program EPI SuiteTM version 3.12 [EPI SuiteTM (2000). Estimation Program Interface for Windows, version 3.12. Syracuse Research Corporation, Syracuse, NY, USA.]

Result : Using the Mackay Level III calculation, the following distribution is predicted for 1,2,4-benzenetricarboxylic acid, decyl octyl ester:

Compartment % Distribution
Air 0.0
Water 0.0
Soil 99.3
Sediment 0.7

Test substance : CAS #67989-23-5; 1,2,4-Benzenetricarboxylic acid, decyl octyl ester
Reliability : (2) valid with restrictions
This robust summary has a reliability rating of 2 because the data are calculated.
Flag : Critical study for SIDS endpoint
21.02.2006 (3)

3.3.2 DISTRIBUTION

3.4 MODE OF DEGRADATION IN ACTUAL USE

3.5 BIODEGRADATION

Type	:	
Inoculum	:	activated sludge, domestic
Contact time	:	39 day(s)
Degradation	:	- (±) % after
Result	:	
Deg. product	:	
Method	:	OECD Guide-line 301 F "Ready Biodegradability: Manometric Respirometry Test"
Year	:	1992
GLP	:	yes
Test substance	:	other TS: 1,2,4-Benzenetricarboxylic acid, mixed decyl and hexyl and octyl esters (CAS No. 68130-50-7)

Result :

Biodegradation was based on oxygen consumption and the theoretical oxygen demand of the test substance as calculated using results of an elemental analysis of the test substance.

By day 4, >60% biodegradation of positive control was observed, which meets the guideline requirement. No deviations from the protocol occurred that affected the integrity of the study data.

The test substance biodegraded to 33.7% after 28 days and cannot be considered readily biodegradable.

Sample	% Degradation* (day 28)	Mean % Degradation (day 28)
Test Substance	33.0, 24.9, 43.1	33.7
Na Benzoate	83.6, 91.5, 83.9	86.3

Sample	% Degradation* (day 39)	Mean % Degradation (day 39)
Test Substance	53.7, 55.6, 59.3	56.2
Na Benzoate	83.6, 91.5, 83.9	86.3

* replicate data

The difference of extremes for the test substance replicates at 28 days was 54%.

Test condition :

Triplicate test systems were used to evaluate the biodegradability of the test and positive control substances at mean concentrations of 50.0 mg/L and 51.4 mg/L, respectively. Blank test systems, which did not contain the test or positive control substance, were run concurrently in triplicate.

The total suspended solids (TSS) of the activated sludge was determined to be 3.93 g/L. The inoculum was added at a 1% loading volume of sludge supernatant to test medium. The microbial count of the inoculum was 106 CFU/mL. One liter of test medium, which was aerated for 24 hours with carbon dioxide free air, was added to each one liter respirometer flask. The test substance was administered by direct addition on glass fiber filters into the test medium. The test system was sealed immediately after addition of the test substance. An aliquot of the positive control stock solution was added to the appropriate test flasks.

An unacclimated activated sludge inoculum was used in this study. The inoculum was obtained from the Clinton Sanitary Wastewater Treatment

Plant, Annandale, NJ, USA. The treatment plant receives domestic sewage.

All test systems were placed on a Coordinated Environmental Services (CES) automated respirometer which automatically recorded the oxygen uptake in general agreement with the OECD guideline. The 39-day study was conducted at a temperature range of 22 ± 1°C °C.

Test substance : CAS Number: 68130-50-7; 1,2,4-Benzenetricarboxylic acid, mixed decyl and hexyl and octyl esters

Conclusion : Not readily biodegradable.

Reliability : (1) valid without restriction
This study has a reliability code of 1 because it followed a standard guideline and used GLP.

23.02.2006 (2)

3.6 BOD5, COD OR BOD5/COD RATIO

3.7 BIOACCUMULATION

3.8 ADDITIONAL REMARKS

4.1 ACUTE/PROLONGED TOXICITY TO FISH

4.2 ACUTE TOXICITY TO AQUATIC INVERTEBRATES

4.3 TOXICITY TO AQUATIC PLANTS E.G. ALGAE

4.4 TOXICITY TO MICROORGANISMS E.G. BACTERIA

4.5.1 CHRONIC TOXICITY TO FISH

4.5.2 CHRONIC TOXICITY TO AQUATIC INVERTEBRATES

4.6.1 TOXICITY TO SEDIMENT DWELLING ORGANISMS

4.6.2 TOXICITY TO TERRESTRIAL PLANTS

4.6.3 TOXICITY TO SOIL DWELLING ORGANISMS

4.6.4 TOX. TO OTHER NON MAMM. TERR. SPECIES

4.7 BIOLOGICAL EFFECTS MONITORING

4.8 BIOTRANSFORMATION AND KINETICS

4.9 ADDITIONAL REMARKS

5.0 TOXICOKINETICS, METABOLISM AND DISTRIBUTION

5.1.1 ACUTE ORAL TOXICITY

5.1.2 ACUTE INHALATION TOXICITY

5.1.3 ACUTE DERMAL TOXICITY

5.1.4 ACUTE TOXICITY, OTHER ROUTES

5.2.1 SKIN IRRITATION

5.2.2 EYE IRRITATION

5.3 SENSITIZATION

5.4 REPEATED DOSE TOXICITY

5.5 GENETIC TOXICITY 'IN VITRO'

5.6 GENETIC TOXICITY 'IN VIVO'

5.7 CARCINOGENICITY

5.8.1 TOXICITY TO FERTILITY

5.8.2 DEVELOPMENTAL TOXICITY/TERATOGENICITY

5.8.3 TOXICITY TO REPRODUCTION, OTHER STUDIES

5.9 SPECIFIC INVESTIGATIONS

5.10 EXPOSURE EXPERIENCE

5.11 ADDITIONAL REMARKS

6.1 ANALYTICAL METHODS

6.2 DETECTION AND IDENTIFICATION

7.1 FUNCTION

7.2 EFFECTS ON ORGANISMS TO BE CONTROLLED

7.3 ORGANISMS TO BE PROTECTED

7.4 USER

7.5 RESISTANCE

8.1 METHODS HANDLING AND STORING

8.2 FIRE GUIDANCE

8.3 EMERGENCY MEASURES

8.4 POSSIB. OF RENDERING SUBST. HARMLESS

8.5 WASTE MANAGEMENT

8.6 SIDE-EFFECTS DETECTION

8.7 SUBSTANCE REGISTERED AS DANGEROUS FOR GROUND WATER

8.8 REACTIVITY TOWARDS CONTAINER MATERIAL

(1) EPI SuiteTM (2000). Estimation Program Interface Suite, v3.12. Syracuse Research Corporation, Syracuse, NY, USA.

(2) ExxonMobil Biomedical Sciences, Inc. (2005). Ready Biodegradability: OECD 301F Manometric Respirometry Test. Study No. 0533179.

(3) Mackay D (1998). Level III Fugacity-Based Environmental Equilibrium Partitioning Model, Version 2.1 (16-bit). Environmental Modelling Centre, Trent University, Ontario, Canada.

(4) Wilson, A., (1996). Plasticizers - Selection, Applications and Implications. Rapra Review Reports 8:15-16.

10.1 END POINT SUMMARY

10.2 HAZARD SUMMARY

Remark : Because of the similarity in chemical structure, the Panel believes that the toxicological properties of the substances in this category will be similar as well. Thus, the Panel considers that the data for the best tested member of this category, tris-2-(ethylhexyl) trimellitate (TOTM), also represents the potential for human and environmental effects of the other members of this category.

TOTM has been sponsored under the OECD SIDS program through ICCA. A review of the available data for TOTM (see attached Table) indicates that all endpoints have been adequately addressed, and that TOTM exhibits a low order of toxicity.

Due to their higher molecular weight and bulky side chains, the remaining members of this category are expected to demonstrate a lower order of toxicity than TOTM. This is supported by a similar structural-activity relationship observed with phthalate ester compounds, i.e., the higher molecular weight phthalates (ester side chains >C7) are less active that the transitional phthalates (ester side chains C4-C6). Thus, the use of TOTM to represent the potential hazards of the other category members is a conservative position.
Chapters 4 & 5

Attached document : Summary of SIDS Information on Trimellitates.doc
Flag : confidential, Critical study for SIDS endpoint
21.02.2006

Attached document : 2xasset.Log
21.02.2006

10.3 RISK ASSESSMENT